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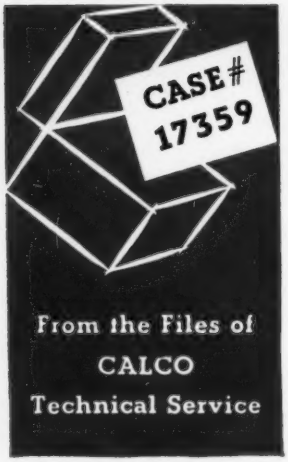

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The Straightening of Woven Goods

In Finishing Plants

CARL SCHLATTER

I. INTRODUCTION

IN woven textile materials, the filling yarns or weft yarns are straight and at right angles to the warp when the cuts are taken from the loom. One glance at a loom will show that this machine is so built and adjusted that the yarns in the cloth made will of necessity be in the relationship just described.

The straightening of woven goods after bleaching, dyeing, printing and finishing, is necessary because during this processing the straight line, right-angle relationship is disturbed. This is caused by the roping of the material, pulling through pot-eyes, squeezers, washers, scutchers, and, in open widths, through imperfect sewings and imperfect alignment of the rolls in open width machines.

The degree of distortion varies, depending on the construction of the goods and on the treatment they receive. Under construction are included all factors such as material count, weight, yarn specification, as well as weave room defects, i.e., loose or tight selvedges, or uneven warps.

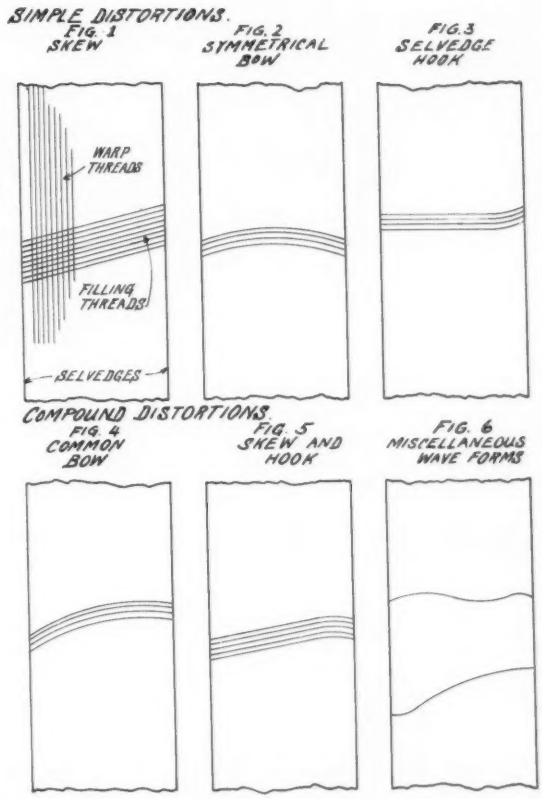
On certain types of fabrics, such as crepes, matelasses, seersuckers, etc., a certain definite change of the relationship of the yarns from the woven to the finished goods is wanted, and is built into the fabrics by the twist of the yarns and the construction of the weave. These kinds of distortions are outside the scope of this discussion, except insofar as unwanted distortions occur together with the wanted change, and we will mention the special problems of correcting these unwanted distortions in fabrics of this kind.

II. DESCRIPTIONS OF DISTORTIONS

We are going to list and, for purposes of definition, classify the various kinds of distortion. They are distinguished first with regard to their form, and then with regard to the causes.

1. Forms of Distortion

The various forms of the distortions are shown in Figures 1 to 6.



2. Causes of Distortion

The distortions shown above may be temporary or permanent. Temporary distortions are produced by pulling wet fabrics out of shape and drying them in that condition. The pulling tensions never exceed or even approach values which will permanently stretch or damage the yarns. Most distortions encountered in finishing plants belong in this class.

Permanent distortions are caused by pulling certain portions of the fabric beyond the elastic limit, thereby damaging the yarns. Shrinking of certain parts of a fabric by chemical means will produce a similar result, but in a well-operated plant this should seldom occur. It is practically impossible to straighten goods of this kind, although the appearance may be improved somewhat by a straightening machine.

Permanent distortions of this type are the result of carelessness and neglect, and they are to be corrected by elimination of the causes which produce them.

Tight or slack selvedges also cause distortions which must be classed as permanent. These defects are usually noticed in inspection of the grey goods, or else they are revealed by serigraph breaks. The elimination of this fault is up to the grey mills.

Everything in this paper pertains to correcting temporary distortions which, with today's knowledge of textile processing, unavoidably occur, to a greater or lesser degree.

III. EFFECT OF DISTORTION

The disadvantages of distorted filling, in the mill language called "crooked filling," are more numerous than is generally realized, and a discussion of its effects for various applications is really in order.

Curtains with distorted filling do not look neat. The cutting, matching, and sewing of the curtains is more difficult, and they will have a greater tendency to hang crookedly after washing and pressing.

Dress Goods. Crooked goods will change readily in laundering, and garments will therefore not retain their shape as well as those made from good material.

Sheeting. For high grade work, the sheets are torn to make sure the hems are true with the filling yarns. Crooked cloth has to be pulled straight before folding, and when folded, it will not look as neat. Crooked filling makes labor and seconds go up. Low priced sheets are machine-cut at right angles to the warp, and distorted cloth will look unsightly and make ugly hems, besides producing a high amount of seconds.

Printing. The printing of handkerchiefs and checker designs on distorted material makes for especially unattractive merchandise. The greater the degree of distortion, the slower is the cutting and hemming, and the higher the percentage of seconds.

IV. BASIC METHODS OF CORRECTION

1. First Method

Today, we are using two radically different methods to straighten distorted filling yarn. The older one consists simply of holding back by hand the forward portions of the filling as the goods enter a machine, for example, a tenter frame or calender. This method is especially adapted to correct a selvedge hook, as shown in Figure 3, and to do this the finisher runs the goods in the machine with the hook pointing forward, i.e., in the direction of the travel of the goods. The degree of correction which can be obtained by this means is limited, for it depends on the elasticity and speed of the goods and on the type of distortion. The heavier the goods, the harder it is to hold them back at any point, and the faster they travel the more bothersome becomes the frictional heat created, and the harder it is for the operator to see the filling. Furthermore, if the operator uses his hands for braking and holding back, he can effectively control only about 18 inches of width, and on forty-inch goods, one man cannot cope with the job.

Until recently, the operator's hands were always used for braking and hold-back effect. Lately, however, the method has been perfected through the application of mechanical braking means, and with this help, one operator can control the whole width of the fabric. The other limitations still apply, and as we shall see later in the discussion of the machines, this type does not lend itself readily for automatic control.

2. Second Method

The second more universally applicable method of straightening distorted filling can readily be demonstrated by experimenting with a sample about a yard square. The method consists of two motions:

First, pulling of goods filling-wise until yarns are straight.

Second, moving the selvedges with respect to one another until the warp and filling yarns are at right angles.

These two motions may be made in the order named, or the order may be reversed. In the latter case, the final result is the same, but the language to describe what happens has to be changed somewhat.

First, moving of the selvedges parallel to on another until they are in the same position as they were in the loom, i.e., until a straight line through the ends of any pick cuts the warp threads at right angles.

Second, pulling or stretching of filling threads until they are straight.

Before we can discuss the various machines and other mechanical means with which the straightening experiments described above can be performed continuously on a production basis, we must consider some fundamental properties of woven materials. This will give us a better understanding of what the machines must accomplish, and it will show for which type of work the various machines are best adapted.

V. FABRIC PROPERTIES

In straightening fabrics by any method, the stiffness or elasticity of the fabric has to be overcome. The study and measurement of the elasticity of fabrics has received a great deal of attention since wrinkle-proofing has come into more general use, and several instruments have been designed for its measurement. However, all these instruments measure resistance to bending and folding, while here we are interested in resistance to distortion of the fabric in its own plane. While we expect analogies between the behavior of cloth in these two respects, we thought that some attempt at measuring the resistance to distortion in its own plane would be justified, and that it might give us a better understanding of our particular problem.

A simple apparatus, as indicated in Figure 7, was built. It consists of a frame with four 12-inch sides, hinged at all corners. The top and bottom bars turn around pivots in their centers, and from the end of the bottom bar are suspended two pans for weights. The fabric sample is fixed on the frame with adhesive tape, or

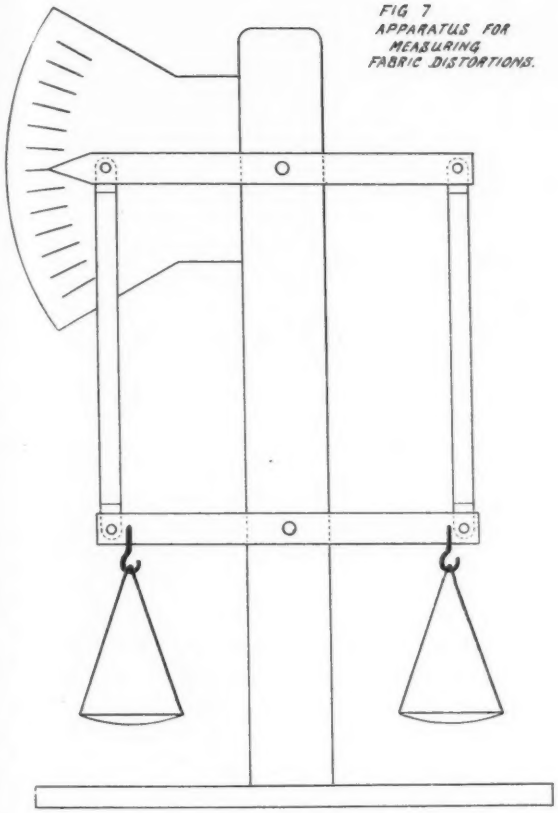


FIG. 7
APPARATUS FOR MEASURING FABRIC DISTORTIONS.

in any other suitable way. The distortion caused by any weight placed in either pan is measured in degrees on a scale at the upper beam.

Several fabrics were tested under various conditions, and as expected, we found the relationship between load and distortion to be a complicated one. For any given sample, the results depend on its previous history, i.e., method of drying, method of breaking, previous distortions, etc., but, with this in mind, the results are reproduceable.

It would lead too far to give all the data here. However, a summary of some of the findings will be of interest to the reader, as they are the basis for some of the statements in the following parts.

We found that there is comparatively little difference in the behavior of such fabrics as shirtings, sheeting, broadcloths, and print cloths between 4 and 5 yards per pound per 36 inches width, and they permit being treated as a group.

All these fabrics in the air-dry state resist distortion to a surprisingly high degree. In the apparatus shown in Figure 7, a shirting fabric of a count of 72 x 88 with a force of 40 times the weight of the sample, gave a distortion angle of only 4½°.

In addition, these fabrics are very springy or elastic, i.e., when the distorting forces disappear, the fabrics spring back toward the normal state. Therefore, if crooked filling is straightened by mechanical means, it will go back to the crooked form when the straightening forces cease. When the forces are applied for the duration of a few seconds to one minute, the "spring-back" is 50 to 75 per cent of the distortion, and even after 12 to 24 hours, the "spring-back" is still 30 to 60 per cent. It follows that these fabrics cannot be straightened dry.

In the wet state, they are even more resistant to distortion than dry, i.e., a given load on the apparatus produces only 2/3 to ¾ as much change as before. At the same time, the fabrics are more springy or "truly" elastic, the "spring-back" being even higher than on the dry samples. This was contrary to our expectations.

Of great importance are the experiments regarding the drying of the fabrics while they were distorted. This procedure establishes a new relationship between the warp and filling yarns. After drying, the samples remain in the new position with little (less than 10 per cent) or no "spring-back." The different methods of drying, i.e., slow drying at room temperature, hot air drying, or drying with hot flat iron, produce different finishes, but as far as "spring-back" goes, they are identical.

From this it can be seen that the straightening of this group of fabrics must be done in the following fashion:

1. Pulling the wet fabrics straight with suitable mechanical means, and,
2. Drying them while they are kept in the straight condition.

For the sake of economy, the straightening should precede one of the regular drying operations of the goods as they go through the finishing plant.

The right-angle relationship of warp and filling is the most stable condition of woven goods. Crooked samples, on breaking, or wetting, tend to change back partly or wholly toward the right-angle condition.

Breaking also eliminates the elasticity of the samples when they are near their normal condition. Samples softened through breaking permit a small amount (½°) of dry straightening. This property becomes more pronounced for lighter fabrics and open weaves. Chiffon crepes, rayon marquisettes, and unstarched cotton netting can be straightened several degrees even without breaking.

The range of dry straightening can be extended to somewhat heavier fabrics, by steaming the goods during straightening, then batching and leaving them on the shells for several hours. With this procedure, the "spring-back" will often be negligible.

However, even on all these light constructions, the straightening effect will have more permanency if the procedure given for the heavier fabrics is used.

VI. CONSIDERATION OF MACHINE DESIGN AND PRACTICAL STRAIGHTENING

The experiments described in paragraph 4, method 2, were made on samples with a given short length, i.e., one yard. The warp yarns were under no tension, and perfectly free to move and permit the filling to become straight on pulling. These conditions do not exist on machinery which has to straighten goods on a production basis. Pieces of anywhere from 60 to 100 yards are sewn together to form

a band, which for purposes of straightening may be considered endless. A corrective movement made at one point will affect the adjoining portions of the fabric for a certain length.

In addition, in most machines and machinery ranges, the warp is under more or less tension. The filling, upon being pulled, has a tendency to become straight, but this is opposed by the tension of the warp yarns, and therefore the filling can straighten only to the point where warp and filling tension are in equilibrium.

In most instances, the tenter is used for subjecting the filling yarns to tension, and a study of the relationship and the effect of warp and filling tension in this machine gives us an understanding of the additional factors which must be considered in the design and operation of machines for weft straightening. Figures 8, 9, and 10 represent tenter frames threaded up with cloth, and, for the sake of simplicity, it is assumed that feed and delivery are for the distance of a few feet in the same plane as the fabric in the machine.

At the entering end, the fabric is held back by the preceding machines and the weight of the compensating gate, and the tension, is indicated by arrows E.

At the delivery end, the fabric is pulled forward by a batching rig, the nip of a pleater (folder) a palmer, or whatever other machine follows the frame. The tension is indicated by arrows marked D.

First let us consider the frame standing still, threaded up with a piece of straight material a few yards longer than the frame. It is evident that when the warp tension is uniform, i.e., when the entering end, tension E, is equal to the delivery tension D, and the tension in the frame itself, a comparatively small pull on the filling will make it straight. See Figure 8.

On the other hand, if D and E are not equal, the difference between the two will be exerted on the filling yarns, and they will be bowed. The amount of distortion depends on the width of the fabric, the tension of the filling, the length of the frame, the value of E-D, and the elasticity of the warp, or, more specifically, on the elasticity of the fabric in the direction of the warp.

With a comparatively low tension on the filling yarns, and a warp with little elongation, the bow will be uniform all the length of the frame, as shown in Figure 9. When the filling tension is high, the picture will be different. The bow will be either smallest in the middle and increase toward both ends, or else smallest at one end and increase continuously to the other, depending on the value of the variables mentioned above.

Naturally, similar results will be obtained when the machine is running. With the entering tension equal to the delivery tension, the tenter chain will exert no pull on the warp yarns (except that to overcome the aerodynamic friction in the frame, which for our consideration is negligible). In this case, straight cloth will go through straight. However, when D and E are not equal, it will be distorted by the frame.

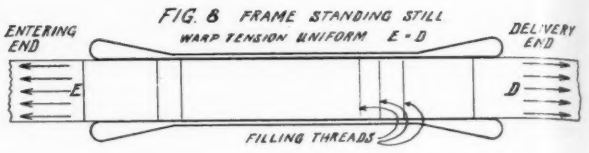


FIG. 8 FRAME STANDING STILL WARP TENSION UNIFORM E = D

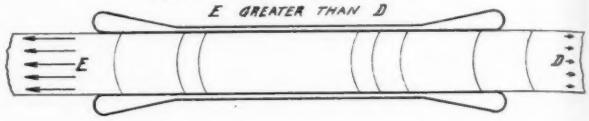


FIG. 9. FRAME STANDING STILL E GREATER THAN D

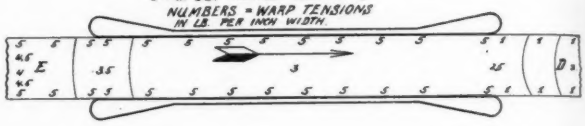


FIG. 10. FRAME RUNNING NUMBERS = WARP TENSIONS IN LB. PER INCH WIDTH.

Figure 10 gives a picture of the condition in the running frame. The direction of travel is indicated by the large arrow, and the numbers show the warp tension in lbs. per inch width. In actual practice, E is almost always higher than D, and for this illustration we have assumed E-D to be fairly big. The figures given serve merely for illustration, and they do not represent actual measurements. The order of magnitude, however, is so chosen that such values would be found on running machines handling about 40 inches, 4 yd. per lb. goods. The numbers give a good picture of the distribution of the warp tension. In the selvedge, this tension is the same in the entering end and under the clips of the chain up to the instant the clips release. Then a sudden change to the value of the selvedge tension of the delivery end occurs. In the center of the goods, the tension changes gradually, and it never reaches the maximum and minimum figures of the selvedge tensions. It can be clearly seen that such conditions will distort a fabric and produce a bow.

Very often the fabric goes over a bar or series of bars at the entering end, and this aggravates the bowing. In addition, selvedge guiders which drag on the cloth also have an effect on the distortion. The degree of bowing on the running frame also depends on all the factors mentioned previously for the stationary condition.

A study of Figures 9 and 10 reveals a fact which must be borne in mind by everybody interested in weft straightening. No amount of filling tension will pull the filling yarns straight as long as the warp yarns exert any pull on the former. Under this condition, a bow can be reduced but not eliminated.

There are limits of filling tension for each fabric which cannot be exceeded. To avoid damage through loss of strength, the filling must not be pulled beyond the elastic limit. Sometimes consideration of finished width may determine the maximum tension which can be used, and in case of crepe fabrics, the crepe effect must not be destroyed.

From the foregoing, it follows that weft-straightening is facilitated by having the warp under little or no tension, or preferably slack, as it will then be impossible to bow the filling. The ideal machine for this purpose would be a pin-tenter with a slack feeding device similar to those used in the early days of Sanforizing. This pin-tenter has to be preceded by an entering end straightener, or else the speed of the pinning mechanism must be so controlled that the selvedges when pinned will be in the same relative position to one another as they were on the loom.

The objections to the use of the pin-tenter are chiefly two: first, the maximum speed of this machine is about ½ to 2/3 that of the clip-tenter, and, second, the shrinking which occurs on the pin-tenter means a loss of yardage which many fabrics cannot stand. Furthermore, when fabrics are straightened prior to being printed, it would be undesirable to shrink them warpwise. The goods would lengthen again on the print machine, and if this lengthening should occur between nips, it would cause trouble in fitting the colors. In fact, we know of no installations today which use a pin-tenter for straightening.

The foregoing considerations also explain the well-known fact that a bow made at a tenter is generally taken out when the fabric is run through a second time with end for end reversed. On the other hand, this relationship of entering end and delivery end warp tension is not always fully understood by the finisher and the machinery builder. The finisher doesn't like to have a high tension at the delivery end, because he loses in width between the clips and the batcher. The machinery designer, on the other hand, does not provide for easy adjustment of the delivery tension. An expansion pulley which cannot be changed on the run is certainly inadequate. The use of a variable speed drive such as the Reeves, or, better still, a gear box with speed changes in steps of one-quarter per cent as used on Sanforizers, appears to be justified. Instruments to indicate the tension would also be of assistance.

I have discussed these various matters in detail, because with the advent of Automatic Weft Straightening, they have assumed new importance. An understanding of the basic relations is very useful to the operators of automatic machines, and it is essential to the machinery builder in the practical application of Weft Straightening Controls. In this he is confronted with a multitude of problems, such as location of control, speed of correction, field of correction, balancing of tension, etc., and they must all be solved to make successful installations.

VII. AUTOMATIC WEFT STRAIGHTENING

Automatic Weft Straightening is an improvement in cloth finishing of recent date. The oldest installations have been in operation for two and a half years. It is a co-operative development of the Winsor & Jerauld Manufacturing Company and the General Electric Company, and the result of their efforts constitutes the only known system of automatic weft straightening.

The equipment for automatic straightening control, like every other automatic control equipment, consists fundamentally of two parts: part one measures the property which has to be controlled, and indicates when it is too high or too low; part two changes the measured property to the desired value, if the too low or too high signal is given.

We are going to describe here briefly part one, which will be referred to simply as the "control." It is built by the General Electric Company, while part two, or the "correcting mechanism," is supplied by the Winsor & Jerauld Manufacturing Company, who also make the actual installation of all the equipment at the plants. The correcting mechanism in its various forms will be discussed under the description of the machines in use for straightening.

The weft straightening control is an instrument designed to measure the angle of the weft or filling threads, and it will detect very small differences in this angle. The system is accurate and rapid. It is based on the frequency with which a beam of light is interrupted by the weft threads of the cloth passed in front of it. This interrupted light is directed on phototubes. The tubes are preset for receiving a normal number of interruptions of the beam of light for a given material.

When skew occurs, the more frequent interruptions, as shown in Figure 13, of the light by the weft threads cause the phototubes (with proper amplification) to operate the motor that drives the straightening device. The motor is controlled by electronic tubes actuated by photo-electric equipment. It operates as follows: A light source with a suitable optical system (Figure 11) is provided for each of two light beams, A and B. These *beams* are approximately 2⅛ inches by .0035 inch. Light *spots,* C and D, approximately 1/16 inch wide, are produced by slots in rotating disks, one slot for each beam. The motion of the light spots bears a direct relation to the cloth speed, and this relation is maintained throughout the speed range of the tenter by Selsyn motors with a Selsyn transmitter driven from the main tenter drive shaft. Figures 12 and 13 indicate this relationship.

Phototubes are placed directly above the cloth, in range of the light beams. As the cloth advances, the weft threads interrupt the light beams, thus producing definite light-frequency inputs to the two tubes. If the cloth is straight, as indicated in Figure 12, the frequencies on the two tubes will be equal. If the cloth is skewed, as indicated in Figure 13, the light frequencies will be unequal, since the path of spot C will intercept more threads than the path of spot D. If the cloth is skewed in the opposite direction, the reverse will be true. This not only gives an indication of skew, but also shows its direction.

The *light* pulsations resulting from C and D are transformed into electrical pulsations by the phototubes by means of suitable amplifiers. The output of each amplifier is transmitted to a frequency-responsive circuit in which a voltage output proportional to the magnitude and direc-

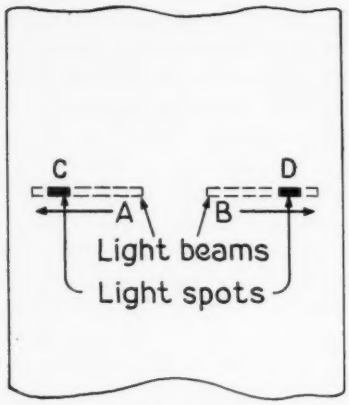


Fig. 11—Cloth Stationary. Note that light spot is visible portion of light beam at a given moment.

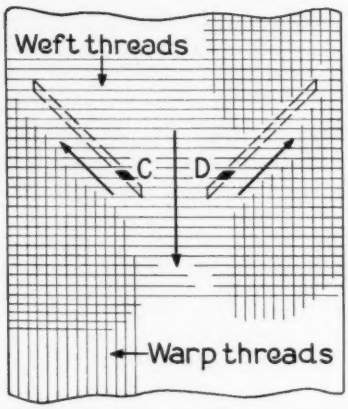
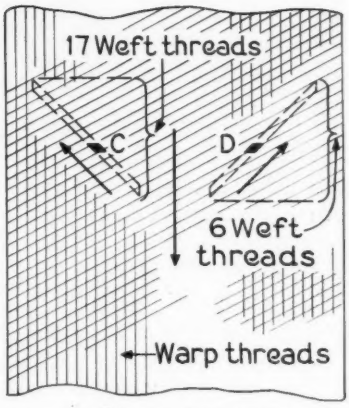


Fig. 12—Cloth in Motion. Weft Threads Straight. Light spots C and D intercept same number of weft threads.



Courtesy, General Electric Co.

Fig. 13—Cloth in Motion. Weft Threads Askew. Light Spot C intercepts more threads than D.

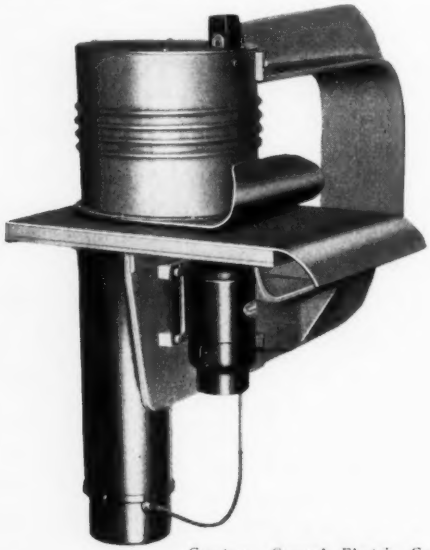
tion of the skew is produced. This voltage controls the operation of the straightening motor through suitable electronic tubes.

Complete equipment for controlling the operation of the straightener on a tenter frame includes:

1. Two optical systems.
2. Two phototube amplifier units.
3. One control unit.
4. One Selsyn transmitter and two Selsyn motors, one for each scanning disk.

The optical system, the synchronous motor, and its scanning disk, and the phototube amplifier are mounted on a C-shaped bracket, as shown in Figure 14. These units are assembled in right-hand and left-hand combinations, and one group is mounted on each rail of the tenter.

For the purposes of this article, we believe the above description of the basic principle of the control is sufficient, and we are not going to describe the details of the various parts, such as the optical system, the amplifier unit, and the output circuits. Either one of the two firms named above will be glad to give further information to anyone who wishes to obtain it.



Courtesy, General Electric Co.

Fig. 14—Scanning Mechanism for G-E Weft Straightening Control. Cloth passes under amplifier unit and over brass top plate.

However, we do not want to conclude this part without making a short comparison between the latest type of controls, and those of a few months ago. The two are identical, except for the output circuits. In the original control, an angle of 91° or one of 95° gave the same constant "too high" signal, while an angle of 89° or one of 85° gave the same constant "too low" signal. The newest controls are of the modulating or graduating type, i.e., a deviation of 5° from the right angle gives a signal approximately five times as strong as that for one degree. This signal is utilized to make the speed of the correcting mechanism proportional to the degree of the skew, and thus the equipment operates much more smoothly, and without over-travel and hunting. With these new controls, the construction of the correcting mechanism is such that its speed is not only proportional to the degree of the skew, but also to the cloth speed. Thus the straightening is at all cloth speeds completed smoothly at a certain constant distance after the control, and the tensions set up in the fabric in pulling it straight are independent of the cloth speed. The advantages of all these improvements and their practical effects to the finisher will be more fully discussed under the headings of Machinery for Weft Straightening, and Accuracy of the Control.

As has been seen, the control operates on light which passes through the fabrics. It is the direct rays coming from the light source through the interstices between the threads and onto the phototubes which actuate the control, and not the small percentage of light which passes through the threads themselves. The control's operation is therefore independent of the color of the cloth, but on the other hand, the fabric construction is of importance in automatic straightening. The interstices between the threads may

(Continued on page 773)

PROCEEDINGS OF THE

American Association of Textile Chemists and Colorists

DECEMBER 26, 1938

Officers of the Association

ALBAN EAVENSON, *President*
Eavenson & Levering Co., Camden, N. J.
DUNCAN FERGUSON—ARTHUR R. THOMPSON, JR. *Vice-Presidents*

WILLIAM R. MOORHOUSE, *Treasurer*
National Aniline & Chemical Co., Boston, Mass.
HAROLD C. CHAPIN, *Secretary*
Lowell Textile Institute, Lowell, Mass.

LOUIS A. OLNEY
President Emeritus and Chairman of the Research Committee
Lowell Textile Institute, Lowell, Mass.

Councilors-at-Large

BERKELEY L. HATHORNE
G. R. KREMERS
WALTER M. SCOTT
HAROLD M. CHASE
ARTHUR E. HIRST
HAROLD DE WITT SMITH

Councilors Representing Sections

BEN VERITY (Rhode Island)
HENRY F. HERRMANN (New York)
DEXTER R. KNEELAND (N. New England)
C. A. JONES (South Eastern)
R. M. RITTER (Philadelphia)
B. C. BLOWNEY (Midwest)
HOMER WHELCHEL (South Central)
RAPHAEL E. RUPP (Piedmont)

Local Sections and Their Officers

Northern New England Section
Clarence L. Nutting, Chairman, Arlington Mills, Lawrence, Mass.
John N. Dalton, Secretary, Pacific Mills, Worsted Division, Lawrence, Mass.

Rhode Island Section
Richard Haworth, Chairman, 25 Fountain St., Providence, R. I.
Louis D. Fleming, Secretary, Woodlawn Finishing Co., Pawtucket, R. I.

New York Section
Louis S. Zisman, Chairman, Gotham Silk Hosiery Co.
33rd St. and 1st Ave., New York, N. Y.
P. J. Kennedy, Secretary, E. I. duPont de Nemours & Co., Inc.
61 Thomas St., New York, N. Y.

Philadelphia Section
William Ebersold, Chairman, James Lees & Sons Co., Bridgeport, Pa.
James P. Conaway, Secretary, Delta Finishing Co., Lewis and Ashland Sts., Philadelphia, Pa.

Piedmont Section
A. Henry Gaede, Chairman, Laurel Soap Mfg. Co., Charlotte, N. C.
J. W. Ivey, Secretary, Mathieson Alkali Works, Inc., Charlotte, N. C.

South Central Section
Nestor Grotelueschen, Chairman, Magnet Mills, Clinton, Tenn.
W. S. McNab, Secretary, Quaker City Chemical Co., Knoxville, Tenn.

Midwest Section
Edward J. Siegrist, Chairman, Holeproof Hosiery Co., Milwaukee, Wis.
Herbert W. Tetzlaff, Secretary, Geigy Co., Inc., Milwaukee, Wis.

South-Eastern Section
Robert W. Philip, Chairman, Editor, "Cotton," Atlanta, Ga.
Alfred R. Macormac, Secretary, Alabama Polytechnic Institute, Auburn, Ala.

Lowell Textile Institute Student Section
Vernon W. Colby, Chairman; William B. Prescott, Secretary.

North Carolina State College Student Section
W. L. Carter, Chairman; Seymour Schandler, Secretary.

Philadelphia Textile School Student Section
Newton Monschein, Chairman; Bernard Menin, Secretary

Members should notify the **Secretary** immediately of all address changes

CALENDAR OF COMING EVENTS

Meeting, Philadelphia Section, Penn A. C., Philadelphia, Pa., January 20, 1939.

Meeting, New York Section, Chemists' Club, New York, N. Y., January 27, 1939.

Meeting, South Central Section, Read House, Chattanooga, Tenn., January 28, 1939.

Annual Meeting, Inter-Society Color Council, New York, N. Y., Feb. 23, 1939—Details to be announced later.

Nineteenth Annual Meeting and Convention to be held under auspices of Northern New England Section in Boston during 1939. Date and headquarters to be announced later.

COMPLETE STENOGRAPHIC REPORTS OF

Technical Papers, Discussions, and Addresses delivered at the Eighteenth Annual Meeting will be published in future issues of the Proceedings.

SOUVENIR BANQUET MENU

Copies of the souvenir menu of the Annual Banquet at Atlanta are available upon request to Robert W. Philip, 1020 Grant Bldg., Atlanta, Ga.

Proposed New Constitution

As Amended in Annual Meeting of December 2, 1938

Article I—Name and Government

Section 1: The name of this Association is The American Association of Textile Chemists and Colorists.

Section 2: This Association is a corporation chartered under the laws of the Commonwealth of Massachusetts.

Section 3: The Association shall be governed by this Constitution and By-Laws.

Article II—Objects

Section 1: The objects of this Association shall be:

To promote increase of knowledge of the application of dyes and chemicals in the Textile Industry.

To encourage in any practical way research work on chemical processes and materials of importance to the Textile Industry.

To establish for the members channels by which the interchange of professional knowledge among them may be increased.

Article III—Membership

Section 1: The membership shall consist of Senior, Junior, Associate, Student, Honorary and Corporate Members.

Section 2: Senior Members only shall have the right to vote, hold office and make motions in the Association.

Section 3: Members of all grades shall be elected by the Council.

Article IV—Qualifications for Membership

Section 1: A Senior Member shall be a person not less than twenty-six years of age with at least five years' experience in the application of dyes or chemicals in the Textile Industry, or in manufacture of or research in dyes, chemicals or fibers for use in the Textile Industry, or in the testing of textile products; except that the Council may at its discretion elect as a Senior Member a person possessing exceptional training and experience which may be of value to the Association.

Section 2: A Junior Member shall be a person who has insufficient age or experience to be a Senior Member but is engaged in a qualifying pursuit.

Section 3: An Associate Member shall be a person who cannot qualify for Senior or Junior Membership but is interested in the objects of the Association.

Section 4: A Student Member shall be a person who is enrolled in an educational institution of established standing, and engaged principally in a course of study leading to qualifications for Junior and Senior Membership.

Section 5: An Honorary Member shall be a person who has rendered distinguished service to the Textile Industry or to this Association.

Section 6: A Corporate Member shall be a corporation or other organization which is interested in the objects of the Association.

Article V—Council and Officers

Section 1: The affairs of the Association shall be managed by a Council.

Section 2: The Council of the Association shall consist of a President, two Vice-Presidents, a Secretary, a Treasurer, the Chairman of a Research Committee, the Past Presidents, and Sectional Councilors representing and elected by their Sections on a basis of proportionate Senior Membership to be specified in the By-Laws, provided that each Section shall have at least one Councilor.

Section 3: The Council shall have full control of the affairs of the Association, subject to the limitations of the Constitution and By-Laws. Twenty-five per cent of the members of the Council shall constitute a quorum; but the Council may make and alter By-Laws for the government of the Association only by a two-thirds vote of its entire membership.

Section 4: The President and each Vice-President shall be elected to serve for one year. A person shall not serve for more than three years consecutively as President, or as a Vice-President, or as a Sectional Councilor.

Section 5: The Secretary, the Treasurer, and the Chairman of the Research Committee shall be appointed by the Council.

Article VI—Nominations and Elections

Section 1: Nominations for the offices of President and each Vice-President shall be made each year by a majority vote of the entire membership of the Nominating Committee consisting of the Sectional Councilors. The Secretary of the Association shall serve as Secretary of the Nominating Committee, but without vote. A report of the Nominating Committee shall be published in the proceedings of the Association before September fifteenth.

Section 2: Additional nominations for any elective office signed by at least twenty-five Senior Members may be filed with the Secretary not later than October eighth.

Section 3: The Secretary shall mail to every Senior Member by October fifteenth a ballot bearing the name of every nominee. Ballots marked and returned to the Secretary by November fifteenth shall be counted before December first by the Secretary and two tellers appointed by the President, and shall elect officers for the term beginning January first.

Article VII—Meetings

Section 1: The Council shall designate the times and places of general meetings of the Association, but the intervening period between meetings shall be not more than twenty months.

Section 2: The Council at each general meeting shall present a report of its proceedings since the last preceding general meeting.

Section 3: Meetings of the Council shall be called through written notice to each of its members as provided in the By-Laws.

Article VIII—Amendments

Section 1: Amendments to this Constitution may be proposed in writing, signed by twenty-five or more Senior Members and presented to the Secretary of the Association by May fifteenth of any year. Such proposals shall be submitted to the Council and shall be published in the Proceedings of the Association, with the recommendations of the Council, before September fifteenth. The proposed Amendment shall be placed on the ballot for the election of officers. Approval by two-thirds of the ballots marked and returned by November fifteenth shall make the proposed Amendment effective on the next following January first.

Section 2: Any changes in the order or number of the Articles or Sections of the Constitution required by an Amendment shall be made by the Council.

Section 3: This Constitution shall supersede all previous rules of the Association.

Section 4: When the Secretary shall have reported this new Constitution adopted by letter ballot of the membership, the Council elected under the old Constitution shall meet to adopt By-Laws and to determine the number of Councilors to be elected by each Section for its proportionate representation. Councilors at Large elected under the old Constitution shall hold office until the adjournment of this meeting. New Sectional Councilors required to fill vacancies at this time shall take office thereafter upon their election. The President, Vice-Presidents, Secretary, Treasurer, and Sectional Councilors elected or appointed under the old Constitution shall so remain until others are elected or appointed at times and in the manner prescribed in the new Constitution and By-Laws. Terms of office under the old Constitution shall be counted under the three year limitations of Article V, Section 4, of this Constitution; with years as a Councilor at Large counted equivalent to years as a Sectional Councilor.

Three years after adoption, this Section 4 of Article VIII shall be omitted from future printings of the Constitution.

Facts of Interest Concerning the

Eighteenth Annual Meeting

Atlanta, Ga., December 2 and 3, 1938

ATTENDANCE

THERE was a total of 486 registrations of men at the Atlanta meeting. There were 63 ladies at the lunch which the Southeastern Section gave the visiting ladies, complimentary, on Friday, December 2nd.

At the Friday luncheon for men, there were 317 plates served. At the Friday evening barbecue supper, there were 490 plates served, which included the ladies present. At the banquet on Saturday evening there were 644 plates served.

EXHIBITS

In conjunction with the annual convention, the Southeastern Section arranged an attractive and variegated display of southern textile products, on exhibit in the Georgian Ballroom of the Atlanta Biltmore Hotel. These included exhibits from the following:

Tennessee Eastman Corporation, Kingsport, Tenn., rayon and rayon products.

Tubize Chatillon Corp., Rome, Ga., rayon and rayon products.

North American Rayon Corp., Elizabethton, Tenn., rayon and rayon products.

Fulton Bag and Cotton Mills, Atlanta, industrial products.

Callaway Mills, LaGrange, chenille bath mat.

Spalding Knitting Mills, Griffin, Ga., seamless hosiery.

Thomaston Cotton Mills, Thomaston, Ga., sheets and shirting.

Canton Cotton Mills, Canton, Ga., denims.

Newnan Cotton Mills, Newnan, Ga., colored and novelty yarns.

E-Z Mills of Georgia, Cartersville, Ga., knitted underwear.

Pepperton Cotton Mills, Jackson, Ga., dress goods materials and table novelties.

Eagle and Phenix Mills, Columbus, Ga., flannels, etc.

Sibley Mfg. Co., Augusta, Ga., mattress ticking.

(Continued on page P767)

Snapped at the Eighteenth Annual Meeting

Atlanta, Ga., Dec. 2 & 3, 1938

Photos by Dr. H. C. Chapin

Eighteenth Annual Meeting

(Continued from page P765)

Atlanta Woolen Mills, Atlanta, Ga., woolen products.

Swift Mfg. Co., Columbus, Ga., upholstery and drapery material.

Lanett Bleachery and Dye Works, West Point, Ga., finished goods.

Pepperell Mfg. Co., Lindale, Ga., sheets, etc.

Muscogee Mfg. Co., Columbus, Ga., towels and toweling.

Georgia-Kincaid Mills, Griffin, Ga., towels and toweling.

Bibb Mfg. Co., Mason, Ga., broadcloths, etc.

J. & P. Coats, Austell, Ga., sewing threads and twines.

C. M. Jones Company, Calhoun, Ga., chenille bedspreads and rugs.

An addition to the exhibit was an attractive display from the Martha Berry Schools of Rome, Ga., which included students in Colonial costumes operating hand-spinning wheels and looms.

BRIDGE

At the luncheon and bridge for ladies given complimentary by the Southeastern Section on Friday, December 2nd and presided over by Mrs. James Ivey White, chairman of the ladies' committee, Mrs. Max Parker of Kingsport, Tenn., won a dress pattern of pink rayon material contributed by Union Bleachery, Greenville, S. C.; Mrs. Irving J. Royce of Charlotte, N. C., won second prize, a package towel set contributed by Muscogee Manufacturing Co., Columbus, Ga.; Mrs. Royce Smith of Columbus, for low score, won a chenille bathroom set contributed by Callaway Mills, LaGrange, Ga. Mrs. J. M. Youngblood of LaGrange, Ga., as first cut prize winner, won a dress pattern of Teal blue rayon challis, contributed by Tubize Chatillon Corporation, Rome, Ga., and Mrs. Carl Hartrumph of Columbus won second prize, three pairs of full-fashioned hosiery contributed by Archer Hosiery Mills, Columbus, Ga.

GOLF

In the golf tournament, held Saturday afternoon, December 3, Milton Harris of Washington won the silver loving cup presented by the Southeastern Section for low gross score. R. A. Field, Jr., of Newnan, Ga., won a zipper bag, Henry Herrmann of New York won a rain jacket, these being contributed by the Southeastern Section, and George H. Small of Atlanta won a golf suit contributed by Callaway Mills of LaGrange. R. T. Lindsey of Alexander City, Ala., won a pair of denim overalls contributed by Canton (Ga.) Cotton Mills for high score in the golf tournament. These prizes were awarded at the banquet by Charlie Yates of Atlanta, present British amateur golf champion.

HEAD TABLE

Seated at the head table at the Annual Banquet, held Saturday evening, December 3, from right to left, were: Dr. Carl Z. Draves, chairman of the technical program committee; Theo M. Forbes, executive secretary, Cotton Manufacturers Association of Ga., Atlanta, Ga., John H. Cheatham, president American Cotton Manufacturers Association, of Griffin, Ga., and a member of the Textile Committee for the Administration of the Fair Labor Standards Act of 1938; W. H. Cady, R. E. Rose, P. J. Wood, E. H. Killheffer and L. A. Olney, past presidents of the association; Arthur R. Thompson, Jr., vice-president of the Association; Miss Christy Kennedy, secretary to Senator Walter F. George; Mr. Alban Eavenson, president of the association; Robert W. Philip, chairman of the Southeastern Section, Toast Master; Senator Walter F. George; Scott Russell, executive vice-president, Bibb Manufacturing Company, Macon, Ga.; Mrs. Alban Eavenson; Dr. Harold C. Chapin, secretary of the association; Mrs. R. E. Rose; Mrs. Allen Jones; Mrs. R. W. Jennings; Chas. A. Collier, vice-president, Georgia Power Company, Atlanta; Mrs. Theo. M. Forbes; R. W. Jennings, superintendent, Lanett Mill, West Point Manufacturing Company and president Alabama Cotton Manufacturers' Association; Charlie Yates; Edward E. Pickard, secretary, Textile Foundation; Duncan Ferguson, vice-president of the association; Mrs. Allen Jones; and A. R. Macormac, secretary of the Southeastern Section.

Edward T. Pickard, center, secretary of the Textile Foundation, and C. A. Jones, right, director of the Textile Department, Georgia Tech, watching Betty Attaway, a student at Berry Schools. The spinning wheel was part of the exhibit of the Berry Schools in the lobby of the Atlanta Biltmore during the eighteenth Annual Meeting and Convention.

Photo by Wilson, Atlanta Constitution, Atlanta, Ga.

PRIZES

Seventeen southern textile mills contributed products which were awarded as prizes during the annual convention of A.A.T.C.C. in Atlanta. The list of these mills with the textile products distributed as prizes follows:

1. Towel set from Van-Moore Mills, Inc., Franklinton, N. C.
2. Dundee Towel Set, from Georgia-Kincaid Mills, Griffin, Ga.
3. Pink rayon dress pattern, from Union Bleachery, Greenville, S. C.
4. Sanforized suiting pattern, from Bibb Mfg. Co., Macon, Ga.
5. Box of crochet twine from Bibb Mfg. Co., Macon, Ga.
6. Chenille bath set, from Callaway Mills, LaGrange, Ga.

7. Golf slacks and jacket, from Callaway Mills, LaGrange, Ga.

8. Two dress patterns (black and teal blue), rayon challis, from Tubize, Chatillon Corporation, Rome, Ga.

9. Rayon moire taffeta, from Gossett Mills, Anderson, S. C.

10. Muscogee towel set, from Muscogee Mfg. Co., Columbus, Ga.

11. Candlewick bedspreads and bath mats, from Mary Ann Spread Company, Calhoun, Ga.

12. Thomaston percale sheets, from Thomaston Bleachery, Thomaston, Ga.

13. Sanitex diapers and towels, from Oconee Textile Co., Whitehall, Ga.

14. Five broadcloth dress patterns, from Crystal Springs Bleachery, Chickamauga, Ga.

15. Candlewick bedspread from Cabin Crafts, Inc., Dalton. Ga.

16. Three pairs full-fashioned hosiery, from Archer Hosiery Mills, Columbus, Ga.

17. Pepperell percale sheets and pillow cases, from Pepperell Manufacturing Co., Opelika, Ala.

MEETING, LOWELL TEXTILE INSTITUTE STUDENT SECTION

THE first meeting of the season of the Lowell Textile Institute Student Section was held November 21st. Chairman Herman T. Buckley presided. In the election of officers for the new year, Vernon W. Colby was elected chairman, and William B. Prescott, secretary. The chairman appointed Hubert J. Murphy, Herman T. Buckley, and James C. Shore as a membership committee.

Plans were made to hold meetings on alternate Wednesdays, and many prominent speakers are expected to address the section during the coming year.

Respectfully submitted,

WILLIAM J. PRESCOTT, *Secretary.*

Rawstock Dyeing of

Cut Staple Rayon*

WILLIAM GRAHAM WARE**

WE all know that rawstock yarn, beam and package dyeing have been going on for a long time, and the methods used for dyeing and processing cotton are quite well known. Even though Rayon Staple dyeing has been used for years, the methods for dyeing it are not well known due to the fact that the trade has not required spun rayon staple yarns.

CONSUMPTION OF CUT STAPLE RAYON

The consumption of cut staple rayon has doubled several times in the past few years.

Blending

Today we have suitings and other novelty materials made in great yardage of cotton-rayon, cotton-wool, wool-rayon or cotton-wool rayon. The cotton and rayon are both dyed rawstock and blend in bin room by hand and pickers. I find that the blended fibers make it card and spin much more satisfactorily than the straight cotton; that is, of course, if one gets the rayon dyed, finished and dried in the proper way.

LOADING OF DYE MACHINES

Rayon staple is received at the mill in bales similar to that of cotton with the exception that the rayon bales have wads or lumps appearing in layers which must be torn apart and loosely loaded into the dyeing machine. This loading must be given careful attention since this is to help insure uniform dyeings. A properly loaded machine will prevent channeling and give an even circulation which is most essential in rawstock dyeing. Care must be taken not to overload the dye machine, as the fiber would have a tendency to swell and this would prevent the flow of dye liquor.

RAYON DENIER

The rayon denier must also be given consideration as the finer deniers require more space, while the coarser deniers allow better circulation. For example, in a 1,000 pound vacuum dyeing machine 800 pounds 5½ denier 1 inch staple will give as good circulation as a 500 pound 1½ denier 1 inch staple in the same machine. Therefore one must know the fundamental machanics of rawstock dyeing and a few physical properties of rayon staple to do proper dyeing.

PHYSICAL CHARACTERISTICS OF RAYON

Experience has taught me that rayon staple wets out with water or dye liquor very much faster than cotton. When the rayon is saturated it swells and of necessity requires more space. When this expansion takes place in a confined area, it greatly retards the flow of liquor. The finer the denier, the more retarding action you will notice and the less penetration.

WATER USED

The water used for the dyeing should be carefully analyzed as to its degree of hardness, and if it is hard, a water softener will be very beneficial. In dyeing heavy sulfur colors on cotton and rayon in vacuum type machines, one will find if the water is exceedingly hard that a deposit of dye stuffs will be found on the bottom of the dyed

*Presented before Southeastern Section, September 10, 1938.

**Supt. of Dyeing, Mooresville Cotton Mills, Mooresville, N. C.

material. This can be easily corrected by a water softener. If this deposit is not given proper attention it will be a great barrier in the further processing of the fiber, and in the finished product small, hardened particles can still be observed.

With the proper loading of the dye machine, the deniers, the physical reaction of the fiber and the water given careful consideration, we can now devote our attention to the dyeing of Cut Staple Rayon.

DYEING OF DIRECT COLORS ON RAYON

First, let us consider the *dyeing* of *direct* colors on *rayon staple*. Direct dyes have proven their value to the present dyer of rayon staple. There is a wide selection of these shades, and are found to be less injurious to the fiber than sulfur or vat dyes. These colors show great affinity for rayon, but with proper precautions, the material may be dyed very evenly. Since this is a fact, it is advisable to cut the percentage of dyestuff anywhere from 15 per cent to 25 per cent less than that required for cotton. The time limit for dyeing may be decreased to a like ratio. It will also be observed that a better fastness is obtained on rayon than is found on cotton.

The dye is dissolved in a small quantity of water at 120° F. and added to the required amount of water to fill the machine. This is then added to the dry staple through the top of the machine and allowed to penetrate thoroughly. When the machine is filled, start the pump and circulation. The temperature is then slowly raised to 170° or 180° F. and salting is begun. Care must be taken not to salt too heavily, however, this is governed by the combinations of dyestuffs and the depth of shade desired. The material is then given a slight wash, salt and a softener to insure good carding and spinning. Looking at it from an economical standpoint, cut staple rayon dyed with directs and aftertreated with copper chrome and acetic will give a much lower cost than fast-to-light directs, and will be much faster to washing and equally fast to light. When the aftertreating is completed, wash out all the chemicals, and in doing this there is washed out all the finish put on by the rayon manufacturer. Then a new finish must be applied or it will be impossible to run it through the mill, because of its harshness and developed static electricity. This finish must supply enough lubrication and pliability for easy carding and drafting of the fibers, and at the same time have sufficient cohesive properties to produce a good even lap. Most of the lubricants used in the mills have been worked out by the dyer, and several of them have been found to be satisfactory. The finish requirements vary according to local conditions, such as type of dyestuff used, time of storage between the dyeing and processing, relative humidity in the mill, and denier per filament of the rayon staple used.

SULFUR COLORS ON CUT STAPLE RAYON

Dyeing cut staple rayon with *Sulfur* colors is more complicated. It has been found that sodium sulfide tenders rayon considerably and leaves a very harsh fiber. Since this is a fact, care should be taken to use as small amount of sulfide as possible. Concentrated solution should not be put to the rayon, but put into the whole amount of water before adding it to the fiber. This can be easily done by having a standing bath or hot water tank. The sulfur dye should be dissolved in the correct amount of water at the proper temperature. Dye is then added to the entire amount of water needed to fill the dye machine. This solution should be added at 120° F. to dry staple from top to bottom of machine. When the machine is filled, start pump to circulating. Usual dyeing procedure is carried out with the exception of care being given not to raise the temperature over 160° or 170° F. A thorough rinsing is important since any sulfide left in the material will continue to damage the fiber. A treatment at 130° F. with acetic acid or sodium perborate will develop the staple and prevent more oxidation. The same as aftertreated directs, a good finish must be put on the staple after dyeing with sulfur colors to insure good running through the mill.

VAT DYEING OF RAYON

Vat dyeing of staple rayon is considered the *most* difficult, but this has become simplified because of the great improvements in the vat dyes, and now they can be obtained in dispersable powder. The loading of the machine is very important, and care should be taken to see that no lumps or wads are loaded. Caustic soda must be used in this type of dyeing as it has a tendency to swell the fiber more than any other chemical, therefore, caution should be taken not to load the machine too heavily. In the dyehouse at the Mooresville Cotton Mills we have vacuum dyeing machines. These have a very slow circulation, and it is necessary to select dispersable powdered dye and handle it by the pigment method.

The dispersable dye is dissolved in warm water, and a retarding agent such as glue, etc., is added. The solution is then applied to dry staple from top to bottom of machine at the correct temperature according to the dye used. Circulation is begun and run twenty minutes. Then caustic soda is added, and run ten minutes; then hydrosulfite, circulated thirty minutes more. The dye is then thoroughly washed out and oxidized with sodium perborate at 130° F. This perborate must be washed out and the same finish is given as for sulfur dyes. If these directions are carried out you should have a successful dyeing of vat colors on staple rayon.

DRYING OF STAPLE RAYON

Let us now think of the *drying of staple rayon*. As rayon is slow on giving up its moisture, particular care must be given to the extraction of excess water after dyeing. The modern centrifugal extractor has proven best for this purpose. It will be found again that after dyeing the rayon is in lumps, especially the fine fiber, and this must be torn apart before drying.

Rayon in its wet state is found almost impossible to be blown by fans through pipes to the dryer. If the fiber

is blown you will find it tangled in a rope form. The most satisfactory method is to feed it back of dryer by hand or direct hopper attachment.

The regular cotton dryer may be used satisfactorily with a few minor regulations of speed and kickers. The kickers on the spiked feed apron should be set as close as possible. This assures a good tearing up of the lumps, and allows an even feed on the dryer screen. These two things are most essential in giving a smooth passage of hot air through this bed. The dryer must be put on a slow speed to give a thorough drying on the first run, for excess handling of rayon works to a bad advantage. Do not overdry, as this leaves a harsh and brittle fiber. The denier of the rayon must be considered, as the finer deniers will require much more time for drying than the coarser ones.

CONDITIONING OF STAPLE

The *proper conditioning* of staple rayon by the cotton mill before processing, and the control of relative humidity throughout the mill, especially in the picker and card rooms, has been found to be most helpful. The fiber should not be run for at least 24 hours after drying, for it should be allowed to normalize in a humidified area.

Rayon staple as we know is free from foreign matter and no cleaning operation is required. The main object of the picker is to prepare the staple for good carding and spinning by thoroughly opening the staple and producing a good uniform lap. The least amount of picking employed to produce a satisfactory lap, the better will be the condition of the fiber.

PROCESSING OF RAYON THROUGH MILL

In *processing* rayon staple through the mill with cotton equipment no big changes are necessary. It has been found that rayon will stretch very easily. Therefore more care must be taken to the setting of the rolls and twist factors than on cotton. If one will keep in mind the principals used in the carding and spinning of fine long staple cotton the problem is very simple. With these simple rules in mind, and rayon dyed, dried and conditioned in the correct way, the average mill should not have any trouble in making satisfactory yarns from cut staple rayon.

HAND AND CHARACTER

The *hand* and *character* of the fabric can be changed by different denier rayons. The 1½ denier per filament rayon gives a very soft fabric, while the 5½ denier per filament gives one a fabric with an entirely different hand, similar to wool. By blending these fibers with other fibers, such as cotton, wool and silk, you will find unusual effects produced.

LONG CHAIN AND PACKAGE DYEING

I have successfully dyed cut staple rayon on *long chain* and *package* dyeing machines. When this type of dyeing is done, one gets a much brighter shade than is obtained in raw-stock dyeing. My advice is to use long chain or package dyeing when making rayon fabrics not blended with other fibers.

If further details are desired in this field, I shall be glad to answer any questions when we have the period of open discussion.

SUMMARY

Summarizing our facts on the rawstock dyeing of cut staple rayon we have:

1. The staple should be thoroughly opened and fluffed up before dyeing.
2. The dyeing machine should be carefully loaded, keeping in mind the denier used, since this has much to do with the circulation.
3. To get best results add dye to dry staple from top to bottom of machine before starting the circulating system.
4. A new finish must be applied to the dyed staple to replace that washed off during the dyeing operation.
5. The dyed staple should be evenly dried at the proper temperature.
6. The dyed staple should be thoroughly conditioned before opening, carding and spinning.
7. If hard water is used a water softener will be advantageous.

We all realize that the various dye houses differ in equipment and conditions. Each dyer must work out his own problems. Four years of experience has taught me a great deal in regard to rayon dyeing. The work I find most fascinating, and now I am beginning to see pleasing results. That these facts and suggestions may help you in the future, and make your work more interesting, is my sincere wish.

MEETING, PHILADELPHIA SECTION

THE second fall meeting of the Philadelphia Section was held at the Penn Athletic Club on Friday, December 9, 1938.

Through the courtesy of the Bethlehem Steel Corporation, the motion picture film, "The Making of Alloy Steel," was shown, and Mr. Erb. Gurney of the Bethlehem Steel Metallurgical Department answered questions and described the applications and qualities of the various alloy steels.

At this meeting the election of officers was also held for the year, and the following men were elected for the year 1939 as follows:

Chairman Emeritus—Elmer C. Bertolet.
Chairman—William Ebersold.
Vice-Chairman—Harold B. Dohner.
Treasurer—George E. Kohn.
Secretary—James P. Conaway.
Sectional Committee—Boyce C. Bond, Arthur E. Jones, John F. McCoy, Paul L. Speakman, William Stringfellow.
Councilor—Herbert Travis.

Due to inclement weather our attendance was unusually low.

Respectfully submitted,
J. P. CONAWAY, *Assistant Secretary*.

AMERICAN
DYESTUFF REPORTER

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Holiday Greetings and Best Wishes for a Happy and Prosperous New Year

THE DYER SPEAKS FOR HIMSELF

PROBABLY at no time in the world's history have people been so conscious of color as they are today. In the last twenty years many of our commonest articles have taken on color when, for generations, black or white was the rule. The kitchen stove was black, the bath-tub white; stockings were black and collars white. Today the stove may be green, the bath mauve, stockings are seldom black and the white collar man is only a figure of speech.

No doubt this makes the world a pleasanter place in which to live, relieving dullness, drabness, and monotony. The very meaning of the dread word monotony is derived from mono tone, one tone or color.

Dyers and colorists should and do rejoice that this is so, for the more color the world demands the more need there is for trained men to supply the need. What the world wants it will get, and, since it wants color we are happy to supply it.

As color increases in popularity, new shades and tones are developed until it is a common thing for a dyer to have two to five thousand colors in his active range. Of necessity, this means that many tones differ little from their neighbors. With ninety yellows in the range it is obvious that only close observation will show a variation between numbers 46 and 47. Yet each customer has his own idea of a canary yellow and should that be number 46, nothing can convince him that number 47 would do as well. What is true of yellow is equally true of red, blue, and violet.

With the primary colors showing so great a variety, it is easy to see that of browns, greys, and slates there is no end. Like combinations on a safe they are made of so many integers that their number is almost infinite. It might surprise a layman, however, to find that there are many tones and depths of black. Surely, he might say, black is black. Yet black which is right for knitting is not ideal for shoelaces, nor would either do for a shirting stripe. It is interesting to note that black is seldom dyed with black dye only, but an addition is made of blue, red or other colors to improve the tone.

Just to complicate life for the dyer he must have many ways of dyeing the same color, due to varying fastness requirements. If he dyes only for one mill, this soon becomes routine and he can settle on one or two lines or qualities, but if his work is sold to other concerns his problems have no end. He may dye a red for wrapping twine and the same depth of red for wire covering, broom cord, knitting checks and towel striping. The twine needs minimum fastness and can be dyed quickly and cheaply. The wire yarns must be fast to light and only selected dyes can be used. The broom cord will be polished later and allowance must be made for the change in shade caused by added sizes. Knitting checks must be fast to washing, and stripes in towels must outlast the fabric itself. He may be called upon to dye a red fast to fulling and cross-dyeing, to vulcanizing or to meat juices. Each presents its little problem for his enjoyment. And, with all his crabbing, he does enjoy them and loves to tackle something new.

The cotton dyer may be asked to match a red on wool, silk, rayon or upon a painted surface. Difference in the reflective powers of these materials makes a perfect match impossible. The best he can do is to dye what in his opinion is the closest that can be done, and then hope

the customer will agree with him. At this time it might be well to mention that few firms rely upon the color judgment of any one man, and most places have someone trained in color matching to cooperate with the man who does the dyeing.

What is true of red is true of his 2,000 or more other shades, tones and tints. Each knitter has a tint called roseblush, but are any two alike? Almost. But the dyer who sends A's shade to B is inviting trouble in the form of a shipment returned for redyeing.

The colorist is alone in his need for exact and complicated matching. Sizes of grey yarn differ from coarse, loosely twisted varieties, to multiple ply, hard twisted cords. Yet where can you find a grey yarn salesman offering 2,000 varieties? Now, if a knitter finds 18's yarn too coarse for his work, he changes to 20's or 22's. He would not expect to get 18.42's or 18.96's. Yet, when he orders a beige tone in colored yarn he asks for just that. Not the dyer's number 108 or 109 but 108.22—and he gets it.

Well, says the customer, that's what a dyer is for. True. But the dyer must make his work pay. Colors are charged to the customer at cost plus a reasonable profit. The more it costs to dye, the more he must charge. And many colors make expensive work. Machines must be cleaned more often, larger stocks of dyes must be kept on hand at all times, and small batches must be dyed in place of large ones. Deliveries are slower, for, with so many shades it is not possible to keep stock of each dyed ahead. If six knitters took the same roseblush it would be practical to keep a supply dyed, ready for immediate shipment. This would bring down costs, for stocks could be built up in slow seasons ready for rush orders.

We have spoken of a color being fast-to-light, or fast-to-washing. These terms are only relative, for no color has perfect fastness to either or to any other stated quality. British, Swiss, German, American and Canadian groups have set up or attempted to set up standards of fastness. No two agree perfectly upon any one point. So the dyer is shooting at a target which is lost in a haze.

Then again there are customers' terms, often quite vague, such as "reasonably fast to home washing," or "two degrees darker than enclosed sample," or "a brown, slightly brighter than tan submitted." Home washing might be anything from a mild suds in lukewarm water to a boil in a strong alkaline liquor. Two degrees darker means what you want to call it while slightly brighter will vary with each individual who says it. Lost in a fog of indefiniteness, the dyer, like the poor benighted Hindoo, does the best he kindoo.

A carder has many chances for variation in his work. His machinery may get out of order, the humidity of the room will affect his work, he may have several lengths of staple to contend with, and he has the usual human variation from good men to poor. The spinner has the same type of trouble, as does the weaver. Summed up this means that they must contend with machines and men, none of which are perfect.

The dyer has these troubles and in addition has chemical and thermal troubles. Too much or too little of any ingredient in a formula will throw off the shade, and might even destroy the fiber. Too hot or too cold, too short a run or too long, quick drying or slow, in a hot or cool dryer. Whether the machine is of wood, iron, Monel or stainless steel will affect the shade. Even the color previously dyed in the same machine may alter results.

Should the machine be perfect, the operator most careful, the dye weighed exactly to a proven formula, the length of time and the temperatures of dyeing and drying right, then the shade must be right. But sometimes it is not, and then we have a problem to solve. Well, a brown may be dyed with blue, red and yellow dyestuffs. If the keg of red is gone and another has been opened it may be stronger or weaker. The difference may be slight, say 1 per cent. In dyeing a red this would not be seen, but as an ingredient of brown the slightest variation will show. Let us suppose the red is weak, then the sample will show this and it would seem easy to add more. But in running longer to get the added red on the fiber a little more blue goes on, or yellow. Only years of experience will help now, together with a lot of dyer's luck. Contrary to popular opinion, profanity is not effective, no matter how expert.

By this time the reader may be feeling pretty bad for the dyer, realizing how cruelly fate has used him. But the worst is yet to come.

After thirty or forty years' experience, a dyer may become quite expert at dyeing cotton, wool or silk, or all three. New problems come up from time to time which he takes in his stride. If yarn is harsh he softens it; if cloth is sleazy he changes his finish; if woolens lack body, he increases his fulling. He begins to feel that life is not too bad and he may carry on. Then some well-intentioned soul invents rayon and he, the dyer, must learn its peculiarities, the most suitable dyes, finishes, and bleaching processes. Just when this is well in hand, along comes acetate, followed by fibers made from everything from cow's milk to corn stalks and soy beans. No wonder the dyer's favorite song is "Long, Long, Ago."

In an attempt to keep the number of shades within reasonable limits, the silk hosiery trade chooses ten to twelve fashion shades each season, giving each a name. This helps, but there is always the necessity of dyeing other colors for repeat or special orders.

Fashion designers, interior decorators, and firms making specialties for milady's fancy are constantly bringing out new tints and tones. These often are only slight variations on colors already well known, yet each must be matched to perfection.

The time may come when it will be possible to standardize upon a range of colors for hosiery, another for leathers, for woolens, for hats and for ginghams, and then the dyer will be happy. Or will he? Perhaps, like the dog fresh from his flea soap bath, he will be a trifle lonesome and extremely bored.

HENRY K. TORPEY.

The Straightening of Woven Goods

(Continued from page 762)

be very small, — 2 to 3 thousandths of an inch, and it is therefore possible to handle fairly close weaves as long as the spacings are substantially the same between all threads. This condition is best fulfilled in plain weaves. In other weaves, the threads may shift somewhat and crowd into certain places. In those places the interstices between the threads will disappear, and no direct light can pass through. This tendency becomes more pronounced the longer the floats are in the weave, and this prevents satisfactory operation of the control on high count sateens, etc.

There is no simple criterion to decide whether or not a fabric can be successfully straightened with an automatic control, and the question has to be answered by the makers of the equipment. However, a little experience with it will soon enable the mill man to make the decision himself.

VII. MACHINERY FOR WEFT STRAIGHTENING

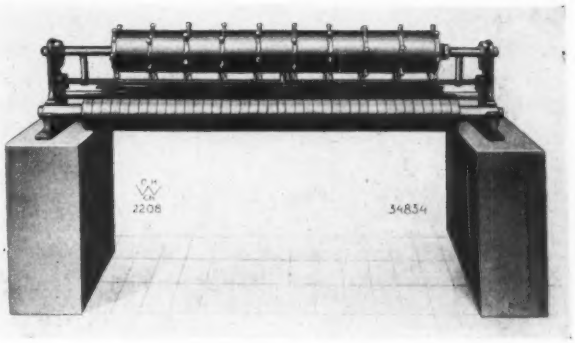
We are now going to review the machines which are in actual use today for weft-straightening, whether by hand or automatically. Most of these machines perform other operations in addition to straightening, and, in the past, the straightening was sometimes considered of secondary importance. The introduction of automatic weft-straightening has put new importance on straightness, and put it on the same footing as uniform width and finish. The special problems of automatic operation will be discussed for those machines with which controls are being used.

1. Hand Straightening Through Braking

This method of straightening through braking or holding back of certain portions of the fabric by hand has already been mentioned under the heading of Basic Methods of Correction, and the limitations were given. It is old and very well known, and no further description is needed, beyond the fact that the operators often wear gloves or use pads to obtain a higher braking effect than they can get with bare hands.

2. Mechanical Braking

A machine for straightening goods by braking with mechanical means has been put on the market during the past few years by C. H. Weisbach of Chemnitz, Germany. A picture is shown in Figure 15. As the fabric passes over the two rolls shown in front, a flexible bar is pushed down between the rolls. The pushing down is controlled by the little nautical steering wheels located in the control cylinder above the cloth. The bar is pressed down deepest in those places where the filling is most advanced as it enters the machine, and those depressed portions function as a brake, and also to some extent as a means of lengthening the path of the cloth. Judging from what we have learned about the machine, it is used in connection with inspecting machines for straightening fabrics dry, and mounted in front of tenter frames to handle damp fabrics. On an inspecting



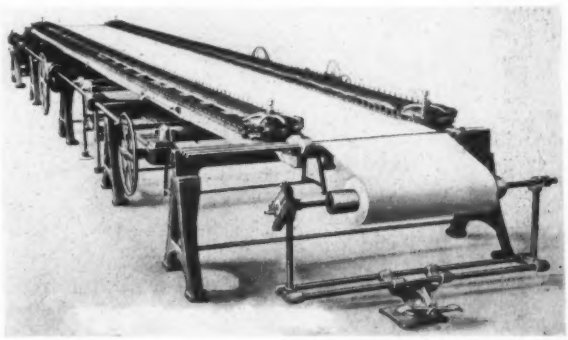
Courtesy, C. H. Weisbach, Textile Machinery Builders, Chemnitz, Germany.

Fig. 15—Weisbach Weft Straightening Machine

machine, it is possible to handle only lightly distorted fabrics, while as an entering-end feeding device to a long frame, it can be applied to almost any cotton goods. For rayon fabrics, the friction over the flexible bar may tend to fray the damp threads, especially on certain types of construction. The equipment does not lend itself to the application of automatic controls.

3. Swivel Let-off for Tenter Feeding

This machine has been in use for many years, and the picture will no doubt be familiar to the reader. By



Courtesy, Van Vlaanderen Machine Co.

Fig. 16—Swivel Let-off with Tenter Frame

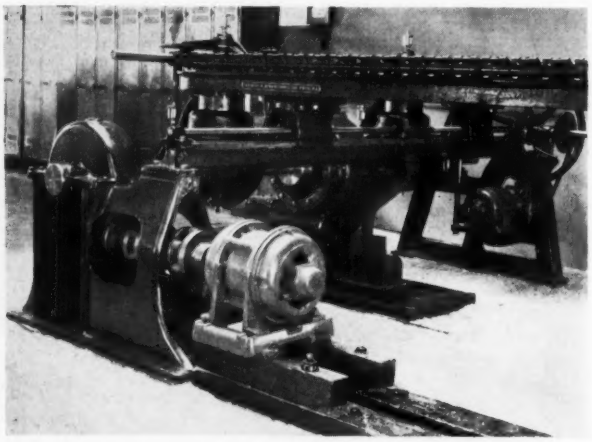
swinging the axis of the cloth-roll in front of the tenter, the distance between the roll and the tenter clips, measured along the selvedge, can be varied, being lengthened for one selvedge, and simultaneously shortened for the other. If, on the roll, the selvedges are not in the same relative positions as they were on the loom, the operator has it in his power to apply a certain amount of correction by increasing the selvedge distance on the side which is ahead.

The swivel let-off is generally used on dry goods, and is therefore satisfactory only for soft non-springy fabrics. Furthermore, the warp tension should be comparatively low. The method is used exclusively on silk and rayon work, both for flat and crepe constructions.

The drawbacks of the swivel let-off are as follows: the goods have to be rolled up on shells, and the frame has to be stopped to tie in every new roll. This increases labor costs. It also complicates the application of automatic control. In fact, to our knowledge, no effort has been made to operate the swivel let-off automatically.

4. Differential Gear Drives for Tenter Frames

Differential gear drives on tenter frames also have been in use for quite a few years, and up to recently were always operated by hand. Their construction is the same



Courtesy, Winsor & Jerauld Mfg. Co.

Fig. 17—Differential Gear Drive for Tenter Frame.

as the rear end of an automobile, and is generally well understood. By turning the spider with the pinion gears one way or the other, one chain can be advanced or retarded with respect to the other by any desired amount. In this way, any skewed filling yarns can be brought into right-angle relationship to the warp.

The power for advancing or retarding the control chain was first supplied by hand and crank, but soon motors and push buttons were introduced. There are several 90-foot tenters with such drives in operation.

The introduction of automatic straightening control immediately set new standards of accuracy in straightening, and it was soon found that the 90-foot frame with a differential drive was not fully satisfactory for accurate work. As has been stated previously, the straightening of springy fabrics always consists of two distinct phases, first, the pulling straight, and, second, the setting. The 90-foot frame with differential drive constitutes an attempt to combine the two operations into one, and a close study shows that this is impossible.

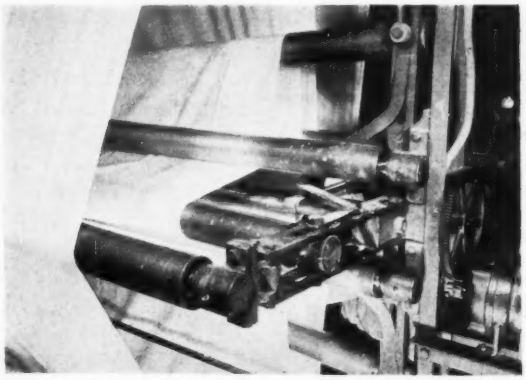
5. Straightening with Tilting Rolls

Tilting or canting roll Weft Straighteners are not new, having been made in the past by several machinery manufacturers. In this country, the H. W. Butterworth & Sons Company introduced them a decade or so ago, and they have made several improvements on the original design.

This type of equipment consists either of one tilting roll in combination with a pair of stationary rolls, or more often of several tilting rolls with the necessary stationary ones. The rolls are suitably mounted and the tilting is controlled by lever, hand-wheel, or with push buttons and motor.

The operation of tilting rolls is similar to that of the Swivel Let-off, in that they lengthen the path of the selvedge which is ahead. Thereby they apply "stretch" to that selvedge and feed it into the following machine in the proper relation to the other. The following machine generally is a 90 foot tenter, but tilting roll straighteners can also be used with dry cans or calenders.

On the long tenter, the straightener operates on wet goods with 50 to 100 per cent moisture, depending on the extraction and on whether or not the goods have passed over a few dry cans ahead of the tenter. While entering the frame, the weft yarns are pulled and straightened, and as the goods go through the frame housing, the yarns are dried and set.



Courtesy, H. W. Butterworth & Sons Co.

Fig. 18—Butterworth Tilting-Roll-Type Weft Straightener at the Duchess Bleachery, Wappinger Falls, N. Y.

Figure 18 shows a close-up of a Butterworth Straightener applying stretch to the right-hand selvedge of the cloth, the position of the tilting rolls being reversed to apply slack to the same selvedge.

Figure 19 shows the tilting roll type straightener in the construction used by the firm of A. Deck, Mulhouse, France.

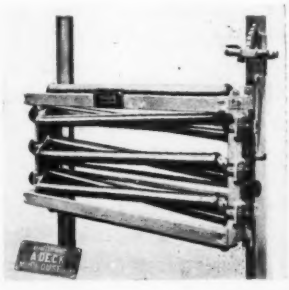


Fig. 19—French Tilting-Roll-Type Weft Straightener.

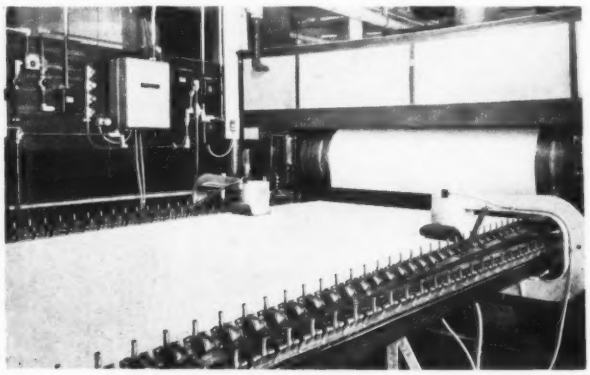
Courtesy, A. Deck, Textile Machinery Builders, Mulhouse, France.

The cloth travel to and from the straightener is quite important, but if planned correctly, this type of equipment can successfully straighten fairly heavy and stiff fabrics.

6. Short Tenter in Front of Dry Cans

A 30-foot tenter frame in front of a dry-can set is used extensively by sheeting manufacturers for framing to width and drying. If the tenter is equipped with a differential gear drive, this equipment combination is well suited for either hand or automatic weft straightening. The goods enter the machine wet. They are taken from a bin through a scutcher, or, in open width, from box trucks. The tenter stretches the filling to the desired width, and as the warp tension is comparatively small, it also practically straightens those yarns. The differential gear drive moves the selvedges relative to one another so that the filling is at right angles to the warp when the goods go on the dry cans. There they are set in that condition.

It is on these machines where the application of automatic control has been most rapid, and so far, most successful. Figure 20 shows the automatic control equipment



Courtesy, General Electric Co. and Winsor & Jerauld Mfg. Co.

Fig. 20—Short Frame—Dry Can Set with Automatic Weft Straightening Control at the Danvers Bleachery, Peabody, Mass.

mounted on a short frame dry can set at the Danvers Bleachery & Dye Works. On the panel board can be seen the control box which contains the frequency responsive equipment and the electronic tubes. Next to the box are seen the tell-tale lamps which indicate the operation of the straightening motors. The degree of accuracy obtained will be discussed later. Suffice it to say here that it is many times better than a man can do at his best. The difficulty of manual control guided by the eye cannot be fully appreciated by anyone unless he has attempted it himself on a machine running bleached material at 80 yards a minute or over. It puts a strain on the eyes to observe moving filling, and after a few hours, one is apt to feel dizzy. In addition to straightness, the operator has other things to watch, and other duties to perform, and he cannot be expected to correct anything but the worst places. He gladly concedes the superiority of the electric eye, which relieves him of a tiresome task.

Automatic control, working through the simple differential gear drive which was originally used on the tenter, was found to put an unduly high tension on certain parts of the fabric, and sometimes to cause wrinkles. With the newer drives, either chain can be retarded relatively to the cloth speed, while the other is advanced a predetermined amount. This drive, coupled with one of the newer controls, constitutes the most advanced design of today.

This equipment is used today only in sheeting plants, but we believe it will be found suitable for other purposes, e.g., for bleached print cloth which is to be printed with handkerchief or checker designs. Bleached print goods are generally dried on cans, and, logically, the straightening should precede the drying.

7. Bow Straightening Apparatus

This is a machine developed by the Cranston Print Works. As the name implies, its purpose is the elimination of the bow of weft yarns, and this is accomplished coincident with the framing of the goods. The equipment consists of a pair of rolls, located next to the delivery end of the tenter frame. The bottom roll is straight, and is made of steel with a special engraving on its surface. The top roll is crowned, and has a soft rubber covering. The speed of these rolls can be varied with a Reeves drive, and the pressure between them is also adjustable.

This equipment is a means for advancing or retarding a broader or narrower portion in the center of the cloth. The width of the band affected by the rolls is determined by the amount of "crown" of the surface, the hardness of the rubber, and the pressure between the rolls, and by proper adjustment of these factors, the bow is corrected readily.

Expressed in the terminology previously used in this paper, the speed variation of the roller pair controls the warp tension at the delivery end of the frame. A distribution of relative warp tensions, similar to that illustrated in Figure 10, can be worked out for this equipment, although due to the crowning of the rolls, the task is more difficult, and it is harder than it appears at first glance to fully understand the operation and the effect of the bow control.

The bow eliminator at the Cranston Print Works has been in operation for several years, and the practical difficulties have been well worked out. United States patents have been granted on the apparatus, and applications have also been filed in foreign countries.

Figure 21 is a picture of a bow straightening apparatus

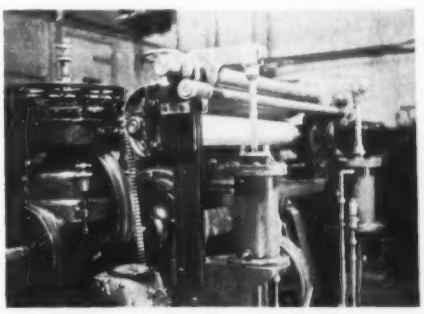


Fig. 21 Bow Straightening Apparatus

Courtesy, Cranston Print Works

mounted at one of the tenters at the Cranston Print Works. The lower roll with its driving sprocket is fully shown, while the top roll is partially hidden behind a bar. The two cylinders to the right are for pneumatic application and adjustment of the pressure between the rolls. To vary the speed of the rolls with respect to the tenter speed, the former are driven from the main tenter drive shaft through a variable speed drive and on this installation a unit of the Link Belt Compony is used for the purpose. The location of this unit is evident from the picture, although only the upper half is shown.

So far, the bow eliminator is controlled by the eyes of the operator, but no doubt it is only a matter of time before automatic control will be applied, and the bow eliminator be combined with some method of skew elimination.

8. Comparison of the Machines and General Considerations

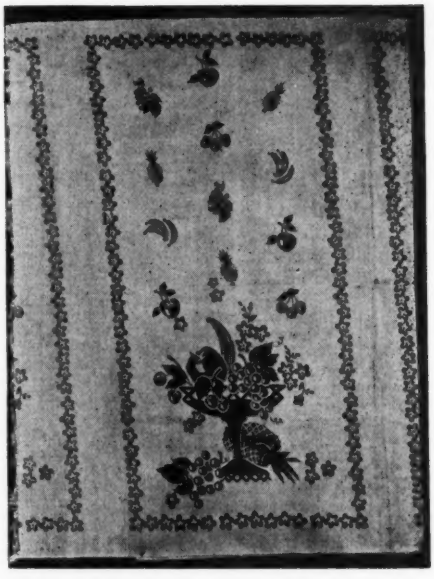
The foregoing descriptions show that all the machines have their advantages and disadvantages. None of the machines can manage all straightening tasks, and any one of them will under certain conditions solve the problem better than the others. We will therefore find all the various types of equipment in operation for years to come. However, we expect a swing to the use of straighteners which are or can be made to operate automatically, because they will do a more uniformly accurate job, and permit higher speeds.

In the selection of straightening equipment in any mill, the fabric properties and the precision of straightness needed must be considered first. Next come considerations of cost, both of the equipment and of operation. For the latter, the speed at which a straightener can produce the desired effect is of greatest moment.

It follows logically that, in a bleachery and dye works, the straightening of fabrics must be done near the end of the processing and that it should just precede the last drying operation. The straightener should work with the drying machine which in the regular course of things is used on the goods. The final processing, such as calendering, doubling, folding, etc., must be watched so that it does not cause any distortions.

In a print works the problem is somewhat more complicated as a single straightening will not be sufficient to produce first class merchandise. Of course this is due to the fact, that a pattern printed on "crooked" goods will be distorted upon straightening of the weft yarns. On big floral patterns the effect of this distortion will not be so noticeable and may not be objectionable, but designs with straight lines or straight rows of figures across the goods will be made very unattractive. This is illustrated in Figure 22. In perfect merchandise the design must not be distorted and in addition the filling must be straight and at 90° to the warp and to obtain this result the goods have to be straightened twice, once before printing, and again after print washing.

The printer has had to struggle with the problem of straightening ever since printing was started, and he follows with great interest the advances in the art which are being introduced at present.



Courtesy, General Electric Co.

Fig. 22—Distortion of Towell Design Caused by Printing on Crooked Goods. (The straightness of the filling is clearly evident at the ravelled edge.)

IX. MEASUREMENT OF DISTORTIONS OF FABRICS

Before we can describe the accuracy of automatic weft straightening, we must indicate how "straightness" is to be measured and specified. In the absence of any better term, the word "straightness" is used, meaning really the deviation of the filling yarns from the straight line, 90° relationship to the warp. To give a description of the straightness of the filling yarns in any fabric, at least three figures are needed:

1. Average angle α of filling.
2. Maximum deviation of filling from the straight line (b).
3. Width of the fabric in inches (w).

The angle might be given in degrees, but we believe the trade would prefer the method of indication we are proposing here.

For skew, give distance a (Figure 23) multiplied by co-efficient $\frac{36}{W}$ to reduce the measurement to a fabric width of one yard.

For bow, give maximum deviation from straight line, or distance b (Figure 23) multiplied by $\frac{36}{W}$ to reduce it to standard width.

Thus the numbers will be directly comparable for all widths, and the indication of width becomes superfluous.

Under this definition, the indication "straightness =

FIG 23. SKEW AND BOW.

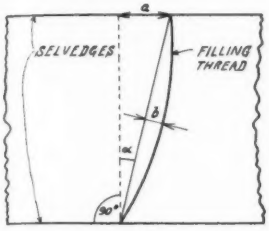
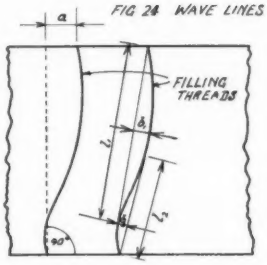


FIG 24. WAVE LINES



MILL METHOD (APPROXIMATE) FOR MEASURING SKEW

FIG 25. SAMPLE OPEN

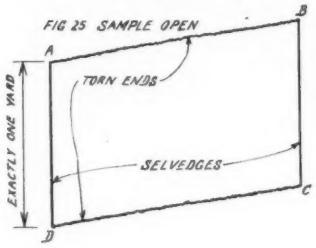
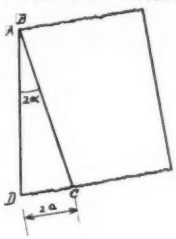


FIG 26. SAMPLE FOLDED



0:0" means perfect goods, while, as an example "straightness = ½:1" indicates a skew of ½ inch and a bow of 1 inch per 36 inch width.

This method can be expanded to indicate wave-line distortions as shown in Figure 24. Instead of having a single figure b, several figures are now required, depending on the number of bends in the filling yarns. In the case illustrated in Figure 24, two bends are measured, b_1 and b_2, and the measurements are reduced to a fabric width of 36 inches by multiplying the figures by $\frac{36}{l_1}$ and $\frac{36}{l_2}$ respectively, where l_1 and l_2 are the length of the bends. Assuming the following values in Figure 24, a = 1 inch, b_1 = 1¼ inches, b_2 = ⅝ inch, l_1 = 30 inches, and l_2 = 15 inches, the indication of the condition of the fiilling would be as follows: straightness = 1:1½, 1½ inches.

This method of describing the straightness of filling yarns is not mathematically accurate in the sense that the exact line of the filling yarns could be computed from them. However, the method will give the textile man at a glance an indication of the straightness of his goods, and it will permit the drafting of specifications and limits for merchandise sold with straightness guarantee.

The accurate measurement of the angle figure a and the deviation b will be somewhat tedious. A piece several yards long, and without creases, has to be unrolled flat on a table so that no tension exists, and so that the selvedge is parallel to the long side of the table. A cut must be made along a filling thread, following it as closely as can be done by the eye. The filling must then be carefully unravelled, until a full thread the whole width is visible. With a straight edge, the distance b can be easily measured, and with a large square against the table, a will be found. (See Figure 23.)

Each measurement must be repeated several times, and the average determined. To describe the average condition of any lot of merchandise, an exact procedure for taking the samples has to be worked out.

For control work in the plant, tearing may be substituted for cutting and unravelling, but it must be done carefully, a few inches at a time, to prevent general distortion.

A piece exactly one yard long is torn out. This piece is then folded by putting corners A and B on top of one another, as indicated in Figures 25 and 26. The value a can be obtained by measuring the distance between the lower corners D and E, and dividing the result by two. (This is not strictly correct, but for all practical purposes, the error is negligible.) To measure b, a straight edge is placed along A B, then on D E, and the average is taken. A convenient form of a straight edge is one of a transparent material like celluloid. This edge has to be about 4 inches wide, and somewhat longer than the widest fabric to be tested. The celluloid is ruled lengthwise with lines one-half inch apart, and these permit very easy determination of the value of the bow b.

X. ACCURACY OF AUTOMATIC WEFT STRAIGHTENING

At the present time, most installations of the General Electric-Winsor & Jerauld Automatic Weft Straighteners operate on sheeting materials, and it is for these applications that we can give some indication of the accuracy obtained. The idea of accuracy in filling straightening is so new that the measurement of value b has been generally omitted. As long as the filling appears straight to the unassisted eye, the operators are satisfied, and they determine only the distance a, by the approximate method.

The builders of the equipment state that in general running, the value of a will not exceed one-quarter inch, and they guarantee it not to exceed one-half inch. It must be remembered that distortions of ¼":¼", or even ½":½" are negligible for practical purposes. Buyers and users of textile materials will not notice distortions of this magnitude unless they make the special tests described above.

This performance is remarkable, especially when it is compared with conditions of a few years ago, when skews and bows of several inches were considered as necessary evils. It is evident that automatic weft-straightening will establish new standards of accuracy previously beyond reach.

The precision of automatic weft-straightening applies to a great range of cloth speeds and constructions, as can be seen from the following table which was issued by the manufacturers of the controls. The table also contains the maximum angle which the equipment is capable of measuring.

	Minimum	*Maximum*
Skew detectable	⅓° (this corresponds to a = ¼ inch)	12° (this corresponds to a = 7½ inches)
Cloth speed	40 yards per min.	140 yards per min.
Cloth width	16 inches	Any tenter width
Weft-thread count ..	20 per inch	100 per inch
Warp-thread count ..		120 per inch

XI. CONCLUSION

From the foregoing, it is quite evident that many difficulties had to be overcome in the practical application of automatic weft-straightening control, and to bring the equipment to the perfection with which it operates today. And it also is clear to all people who have followed its progress, that further advances will be made, that the control will be applied to new lines, and that in a few years straight filling will be demanded by the trade just as much as fast colors. For this reason it was thought that a review of the straightening methods at this time would be met with interest by the men in the industry.

TRADE NOTES • NEW PRODUCTS

• *Zelan Water Repellent*

A new durable repellent finish, named "Zelan," manufactured by the du Pont Company, was demonstrated at a luncheon given on December 13th at Sherry's, New York City. As described at this time by Dr. Samuel Lenher, Technical Manager of the Fine Chemicals Division of the du Pont Company, this product will give fabrics a durable water-repellent finish which will last through repeated launderings and dry cleanings. "Zelan" is the result of several years of laboratory research, Dr. Lenher stated, and is now ready for use by textile manufacturers.

One of the important points of this new repellent finish, he said, is its aid in keeping fabrics fresh and attractive. Materials treated with "Zelan," he declared, do not soil as readily as untreated fabrics, and are resistant to spotting by various liquids and beverages. This finish is said to last throughout the normal life of a made-up garment and to aid materially in maintaining its newness and freshness.

While water-repellent finishes for textiles are not new, previously their durability and degree of repellency has been limited, it was said. Processes for imparting repellency to fabrics have been in use for one hundred years or more. One of the latest of these processes has been the application of a wax emulsion in water in a single bath. The initial repellency of these older processes has been very good, but garments made up from fabrics treated by these processes would lose their effectiveness by either laundering or dry cleaning, it was stated.

The speaker stated that the most important point to be remembered in comparing fabrics treated by the old processes and those treated with "Zelan" is that the "Zelan" treated materials retain their water repellency after repeated launderings and dry cleanings. It is claimed that materials treated with "Zelan" can be advantageously used in garments where it is desired to maintain newness and freshness, or where they are subjected to wearing conditions conducive to rapid soiling. Such garments are house dresses and aprons, children's play suits, waitress' uniforms, white washable uniforms, etc., and raincoats, golf and ski jackets, riding habits and other sportswear. House furnishings will include curtains and draperies, slip covers, upholstery and shower curtains.

Courtesy Du Pont Style News Service.

"Zelan" water repellent finish, manufactured by the du Pont Company, was used on this two-in-one reversible reefer raincoat. The man-tailored styling is shetland wool on one side and on the other a long fiber Egyptian cotton treated with "Zelan" water repellent which, without impairing the weave, color or feel of the fabric is said to render it resistant to wind and water. It leaves the fabric porous to air, therefore, the fabric can breathe and allow proper ventilation of the body. Another practical feature of the treatment is that its effect is said to last through repeated cleanings or washings.

"Zelan" is best applied to fabrics by the textile manufacturer as a finishing process. It is not suitable for use on finished garments, as its proper application requires equipment which is available only in well equipped textile plants.

A demonstration of the properties of this new finish was presented by George A. Slowinske, research chemist of the Fine Chemicals Division of the du Pont Company. Comparative tests of "Zelan" treated fabrics and those treated with older water repellents showed the superior resistance of the new finish to staining by tomato juice, ink, shoe polish and other liquids and demonstrated its durability on fabrics that had been frequently washed or dry cleaned.

A marketing plan to assure the buyer of "Zelan" treated fabrics that the treatment has been correctly applied, was outlined by Hugh Lavery, Advertising Manager of the Fine Chemicals Division of the du Pont Company. Labels have been designed to identify such fabrics and garments, he said, and the use of these labels by the finisher will require a preliminary testing and approval of the effectiveness and durability of the finish by the Better Fabrics Testing Bureau of the National Retail Dry Goods Association. Performance standards have already been set up for many types of fabrics and unless each fabric tested meets the quality standard, it may not carry a "Zelan" label. As a further precaution, samples of each manufacturer's continued production will be tested regularly to assure maintenance of the original high quality.

• GENERAL RELEASES

General Dyestuff Corp., 435 Hudson Street, New York, N. Y., announces release of circulars describing the following products:—

Naphtamine Brown B T L—which is claimed to dye mixed fabrics of cotton and rayon or spun rayon a very uniform shade and is therefore recommended by the manufacturers particularly for hosiery dyeing. Circular I.G. 1474.

Celliton Fast Dark Brown B—which produces very deep brown shades said to be of very good fastness to light on acetate rayon. It is said to show excellent affinity and to level very well. Circular I.G. 1553.

Celliton Fast Dark Green B—which produces popular bottle green shades said to

be of good fastness to light, rubbing and hot pressing. Circular I.G. 1554.

Algosol Brown I V D—which produces a violet shade of chocolate brown, better than either Algosol Brown I R R D or Algosol Brown I B R. It is stated that the new color will be of particular interest for printing. Circular Sol. 70.

Algosol Brilliant Violet I 4 R—a new product of Algosol range which is of interest for various printing styles as well as for dyeing solid shades. For the latter purpose, the new Algosol Brilliant Violet I 4 R is said to be of particular interest, due to its good exhaustion property. Circular Sol. 73.

• NEW LOW PRICE FOR WETTING AGENT

"Tergitol" penetrant 08, a surface-active compound that is said to speed the penetrating ability of water, is now selling at a new low price, according to an announcement by Carbide and Carbon Chemicals Corporation 30 East 42nd Street, New York, N. Y. The new schedule of prices is as follows:

In less than 55-gal. drum lots—30c per lb.

In drum lots (single 55-gal. drum or more)—25c per lb.

At these prices, this wetting agent and penetrant is said to become more economical than ever to use in operations where concentrated aqueous solutions are employed.

"Tergitol" penetrant 08 has been found most effective when the aqueous solution involved contains more than 5 per cent of dissolved substances—acids, bases, salts, dyestuffs, or starches. It is stated that its wetting action continues undiminished indefinitely in solutions containing relatively high concentrations of sodium hydroxide and other alkalies, and salts. Because of its solubility, stability, and penetrative action in very strong solutions, it is said to be a remarkable assistant in all operations where such conditions are encountered. It is said to be effective in speeding the preparation of soda cellulose, in increasing the wetting of soldering fluxes in the presence of strong hydrochloric acid, and in many other applications involving the penetration of concentrated acid, alkali, or salt solutions.

Since "Tergitol" penetrant 08 induces rapid spreading over large surface areas, it can be used to increase the efficiency of metal cleaning compounds, textile printing pastes, and window cleaners. Its stability in hot concentrated alkali solutions, together with its marked surface activity in these solutions, makes it valuable in alkaline cleansing compounds and liquid soaps that are subjected to continuous heating in use it is claimed. Being stable in 25 per cent caustic soda at its boiling point, it is unique among mercerizing penetrants because it not only promotes the very rapid mercerizing of cotton stock but also withstands the rigorous treatment involved in the concentration of mercerizing liquors which have become diluted during "wet mercerizing" processes, the company says.

• MOTORSHIP DOLOMITE 4

The all-welded freighter Dolomite 4 arrived recently at the Colgate Palmolive Peet Pier, Jersey City with 2000 tons of lye in her nickel lined holds.

This motorship, 300 feet long, is said by John H. Odenbach, her designer and owner, to be the largest vessel to pass through the N. Y. State Barge Canal. She had a clearance of only 6 inches in the locks.

While Dolomite 4 arrived at her pier under her own power, she had the unique distinction of passing her own deckhouse at Newburgh, N. Y., according to Captain Fred Swenson, 443 Bement Avenue, West New Brighton, Staten Island, her master.

Built in an abandoned lock of the Erie Canal at Pittsford, N. Y., Dolomite 4 literally never was launched, but was floated by admitting water to the locks and then opening the gates to permit passage to the canal and thence to the Great Lakes, where she has been in service since August carrying cargoes of kerosene and gasoline between N. Y. State Ports and Chicago, Cleveland and other mid-west cities. For this service she was equipped with a deckhouse mounted over a hatch to permit passage under canal bridges. On her maiden trip to salt water, Dolomite 4 carried a cargo of lye (caustic soda) from Wyandotte, Mich., to Jersey City.

Dolomite 4 was built primarily for service carrying caustic soda between Norfolk, Va., and Lake Charles, Louisiana. It was for this purpose that her five main cargo holds were lined with pure nickel sheet to resist the corrosive action of this corrosive chemical.

According to John H. Odenbach, owner and designer of the ship, not only are her holds protected against corrosion by this nickel lining, but they also can be readily cleaned to permit bulk transportation of alternate cargoes of lye, petroleum products, wheat, and even flour. Cleaning is accomplished by steam.

Another novel feature of Dolomite 4 is the fact that she is built entirely of welded steel channels, or U beam. She is not only rivetless but ribless as well.

• CARBIC RELEASES

Carbic Color & Chemical Co., 451 Washington St., New York, N. Y., announces release of circulars describing the following products:—

Indigosol Brilliant I 4 R—yielding clear, reddish violet shades said to be of good fastness on vegetable fibers. It is said to be of good fastness to washing, chlorine and peroxide and, if the usual precautions are observed, the dyeings are suitable for color bleaching. The new dyestuff is particularly recommended by the manufacturers for colored styles, embroidery yarns and similar goods. In textile printing the new product is said to be of interest for direct prints and is best applied by the Indigosol Developer-D — chlorate steaming process or by the nitrite process with preliminary steaming. Circular Sol. 73.

Indigosol Brown I V D—which yields on cotton, rayon and mixed fabrics covered, violet-toned brown shades said to possess very good fastness to light. It can be used in direct printing alongside Rapidogen and Rapid Fast dyestuffs. Pads from Indigosol Brown I V D can be resisted white with Rongalite C L or in colors with vat dyestuffs. Circular Sol. 70.

• GLYCO PHILADELPHIA OFFICE

Leonard Levitt of the Sales Department of the Glyco Products Co., Inc. has established headquarters in Philadelphia to service users of emulsifying agents, water-soluble resins, flame-proofing and water-proofing agents, polishes, detergents, etc.

Mr. Levitt is a graduate chemist of the University of North Carolina. For the past few years, he has devoted himself to applications of newer chemicals for use in the chemical industry, specializing in emulsions for the textile, polish, cosmetic, paper, leather, rubber and allied industries. His temporary address is 49 East Cliveden Street, Philadelphia, Pa., and his telephone number is Tennessee 2768.

• JOINS PHOENIX

Hans A. Holterhoff has been appointed sales manager and head of the technical service department of the Phoenix Color & Chemical Company, Inc., dyestuff manufacturers of Paterson, N. J. it was announced by Lincoln M. Shafer, president of the company.

Mr. Holterhoff is a graduate of the Textile School of Crefeld. It is expected that his wide range of experience in silk and rayon processing as dyer, chemist, and demonstrator will prove of great advantage in his new connection.

• HOUGHTON RELEASES

Leaflets describing two new surface active chemicals—Surfax and Surfax W. O., with factual data and charts, have just been prepared by E. F. Houghton & Co. 240 W. Somerset St., Philadlephia. Copies are available upon request. These surface

active agents are said to possess unusual wetting-out and softening properties. Surfax has also the advantage of high detergent properties.

• TEXTILE ACADEMY

The Textile Academy in the City of New York, in response to many requests, now offers to the industry, a low cost home-study course in Textiles. The Textile Academy has from its inception, looked upon the educational movement in the Textile industry, as a cooperative undertaking with leading graduates of textile institutes and colleges constituting the faculty.

The course of instruction includes: fiber identification, fabric analysis, fabric identification, cotton, rayon, wool, silk, etc. Further information may be secured by writing the Textile Academy, 350 Broadway, New York City.

• DECEMBER TEXTILE RESEARCH

More than half of the December issue of *Textile Research* is devoted to the reports, papers and discussions of the various sessions of the recent annual meeting of U. S. Institute for Textile Research. Two completed researches and two new researches are reported, one of each being economic and one of each technical studies. The formal reports provide an intimate review of the services, objectives and accomplishments of the Institute, and the financial and membership status of the organization. The Board of Directors end their annual report with the following significant statement: "While we feel that substantial progress has been made, and that we are more efficiently organized than ever before, we cannot overlook the fact that our progress is disproportionate to the time and energy contributed by your Board, your officers and your most active members."

Other notable features of this section of the issue are the technical papers presented at the open conference on the warp sizing of cotton and spun rayon, which is one of the new researches to be organized, and the annual address of the president, Dr. E. H. Killheffer. The latter states that, because of chaotic world economic conditions, the threat to domestic industry of the Hull reciprocity treaties, and an apparent trend toward an economy of lower prices, there is more need than ever before for intensive research by industry.

In the regular section of the issue is the usual review of domestic and foreign research literature, and the following original research reports: "The Swelling of Raw and Boiled-off Silk in Relation to Width Measurement," a Textile Foundation research by R. V. Ingram; and "Viscosity of Starch Pastes," by the late Dr. J. R. Katz. The latter starts the publication of a series of 17 reports of the Institute's completed study of starches and the warp sizing of filament viscose rayon.

• FOLDER, OCTYL ALCOHOL

A new four-page folder, "Octyl Alcohol —Anti-Foaming Agent," has just been published by Carbide and Carbon Chemicals Corporation. The folder summarizes the use of octyl alcohol as an anti-foaming agent in a variety of applications. These include: lubricating oil reclamation, rubber latex, printing pastes; the manufacture of dyes, varnish inks, paint, paper; and in air-conditioning sprays; photographic developing solutions; fruit-washing operations; and a variety of similar operations. Wherever aqueous solutions cause undesirable foaming, octyl alcohol can be used with successful results.

This new publication tells how to use the new alcohol and also presents its important physical and chemical properties. Copies of this publication can be obtained from Carbide and Carbon Chemicals Corporation, 30 East 42nd Street, New York, N. Y.

• NEW HYDRION CHART

A new chart printed in fourteen colors (issued by R. P. Cargille, 118 Liberty Street, N. Y.) shows how the Hydrion wide-range pH test paper has been extended to include a color change for each pH unit throughout the range from pH 1 to pH 14. Fourteen buffer solutions, one for each pH unit, are used to bring out on the test paper the characteristic color for any pH unit. Also new is the simple comparator plate included in each vial. This plate makes the colors more vivid and facilitates comparisons.

Hydrion test paper is used like litmus, but gives readings to well within 0.5 pH units. This extremely simple and economical method is said to be a definite advance in pH control for analysis, product testing, and process control.

Color charts will be sent without charge to those interested.

BOOK REVIEW

"A.S.T.M. Standards on Textile Materials." *Prepared by Committee* D-13 *on Textile Materials. Published October,* 1938, *American Society for Testing Materials,* 260 *South Broad Street, Philadelphia, Pa.* 323 *pages. Price* $2.00.

In this paper covered volume the A.S.T.M. has brought together all of their standards on textile materials. This pamphlet contains the methods of testing, definitions, terms, and specifications for textile materials developed by the American Society for Testing Materials, and materials relating thereto. Considerable new material has been introduced since the previous issue and a number of revisions have been made. This edition gives in their latest approved form all of the 52 specifications, tests, and definitions covering textile materials and includes other related information.

It should prove a valuable reference book to everyone interested in the scientific and technical aspects of the textile industry.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

WANTED: Position open in Textile Specialty House, Philadelphia vicinity for Chemist with Cotton and Rayon finishing and dyeing experience, preferably one familiar with the make-up and manufacture of oils, softeners, sizes, etc., used in the industry. Good future assured to the proper man. Permanent position. State expected salary in first letter. Write Box No. 160, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Textile Colorist, Czechoslovakian specialist in printing, dyeing and treatment of cotton and rayon, seeks suitable position in U. S. A. Write to "Z. B. 4209" to PIRAS Ltd., Prague 11, Bredovska 1, Czechoslovakia.

CIBACETE COLORS
for
ACETATE RAYONS

CIBACETE PRINTING POWDERS
for
DIRECT OR APPLICATION PRINTS

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COMBINING BEAUTY AND ECONOMY

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Sole Representatives of
SOCIETY OF CHEMICAL INDUSTRY IN BASLE

Vat Dyes of
THE DOW CHEMICAL COMPANY

UNIFORM DYEINGS
COMPLETE PENETRATION
LESS TIME TO SHADE

With

TETRANOL

#1638

BETTER DYEING jobs are being done with **TETRANOL #1638** because of its speedy wetting out action.

COMPLETE PENETRATION of every fibre by the dye liquor is quickly accomplished, resulting in better exhaustion of the bath and even shade throughout the material being dyed.

ECONOMY and **GREATER PRODUCTION** are also gained by *reducing the time* necessary to get the shade.

TETRANOL #1638 will increase the efficiency and reduce the cost of your dyeing operation, whether you are dyeing pieces, yarn, stock or hosiery.

ARKANSAS CO. INC.

233 BROADWAY NEW YORK

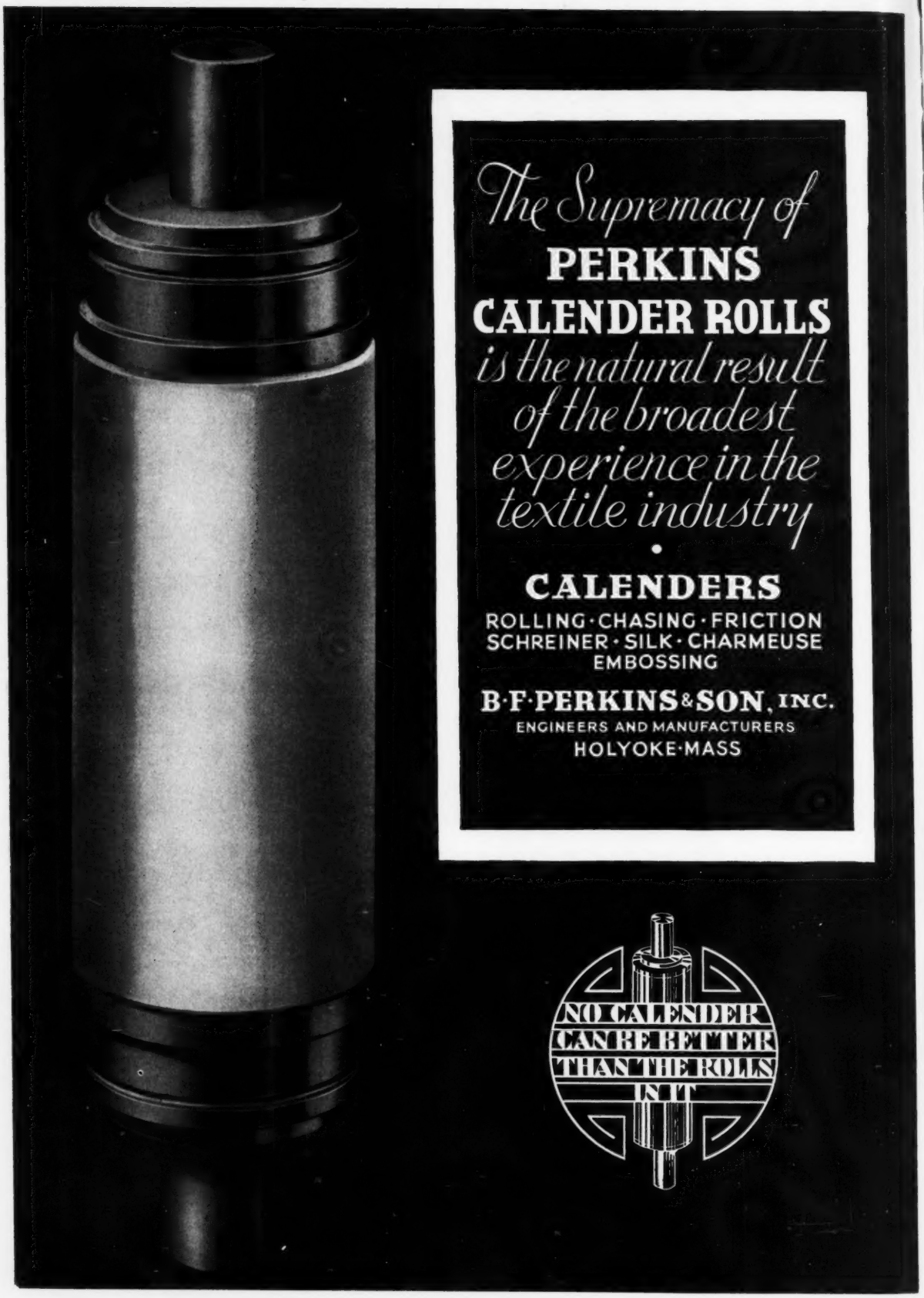
SOROMINES

are the ideal softeners for giving rayon fabrics the smooth, subtle drape that appeals to discriminating customers.

GDC

GENERAL DYESTUFF CORPORATION

435 HUDSON STREET, NEW YORK, N. Y.


The Supremacy of
PERKINS
CALENDER ROLLS
is the natural result
of the broadest
experience in the
textile industry
CALENDERS
ROLLING · CHASING · FRICTION
SCHREINER · SILK · CHARMEUSE
EMBOSSING
B·F·PERKINS & SON, INC.
ENGINEERS AND MANUFACTURERS
HOLYOKE·MASS
NO CALENDER
CAN BE BETTER
THAN THE ROLLS
IN IT

DU PONT ANNOUNCES

ZELAN

TRADE MARK

DURABLE WATER REPELLENT

A remarkable new finish that remains repellent after many washings and dry cleanings

AN ENTIRELY new type, ZELAN offers many advantages over ordinary water repellents—opens up new uses, broadens old ones.

Chemically, ZELAN is radically new. Applied only in the finishing process, ZELAN, a definite chemical compound, combines with fibers to form a durable repellent complex. It does not merely coat them as do the older types of repellents. Thus, ZELAN becomes an integral part of the fiber, remaining through many washings and dry cleanings.

This durability of ZELAN makes practical for the first time a water repellent, spot and stain resistant finish for many garments and furnishings. Because it repels coffee and tea, carbonated beverages and other water solutions, ZELAN will be specified for a wide range of consumer merchandise. It may be applied to cotton, linen, rayon and pure silk. The processing of wool is now being developed. Raincoats, golf jackets, shower curtains, clothing, canvas goods, outdoor furniture, uniforms, gloves, hosiery, tablecloths and a host of other articles will be made of fabrics treated with ZELAN.

ZELAN improves the appearance, drape and handle of fabrics—gives them a softer, smoother finish that cleans and washes more easily than untreated fabrics. This effect also survives washing and dry cleaning.

A standard ZELAN label will identify fabrics that are properly treated. Manufacturers having proper equipment for applying ZELAN will be authorized to use the ZELAN label after fabrics have been tested and approved. The Better Fabrics Testing Bureau, laboratory of the National Retail Dry Goods Association, will test samples for water repellency, moisture absorption and durability. Samples taken from continued production will be tested to assure maintenance of high standards.

The cutting-up trade and piece goods buyers are asking for fabrics treated with ZELAN Durable Water Repellent. For complete technical details and methods of application, write one of our branch offices.

DU PONT
REG. U. S. PAT. OFF.

E. I. DU PONT DE NEMOURS & COMPANY, INC.

Organic Chemicals Dept. . . . Fine Chemicals Division . . . Wilmington, Del.

SALES OFFICES:

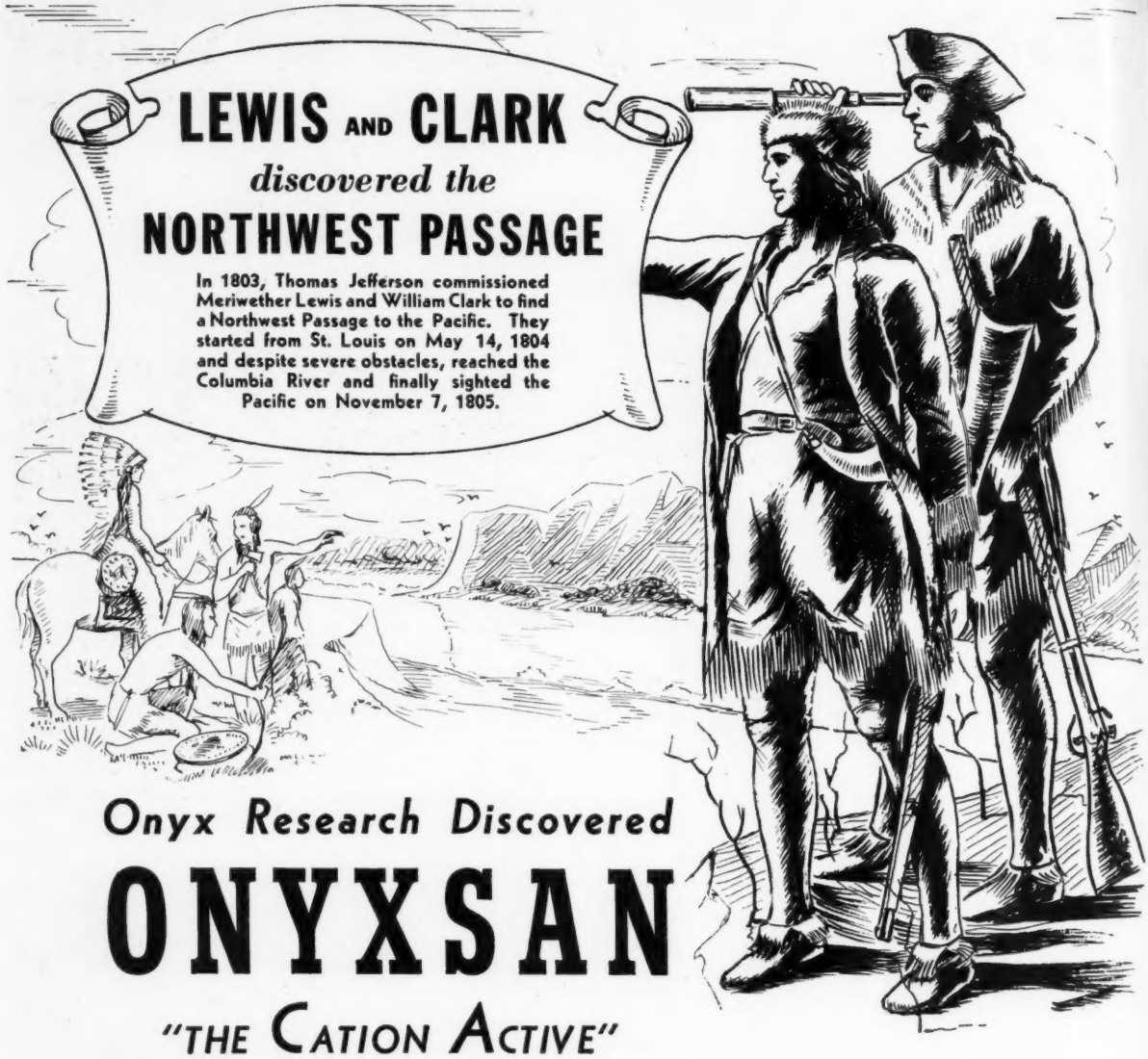
Boston, Mass., Charlotte, N. C., Chicago, Ill., New York, N. Y., Philadelphia, Pa., Providence, R. I., and San Francisco, Calif.
Represented in Canada by Canadian Industries Limited, Box 1260, Montreal, Quebec, and 372 Bay Street, Toronto, Ontario.

DU PONT ALSO manufactures "Aridex"* water repellent—a superior repellent of the wax emulsion type—particularly satisfactory where extreme durability of the water repellent is not required.

*Reg. U. S. Pat. Off.

LEWIS AND CLARK
discovered the
NORTHWEST PASSAGE

In 1803, Thomas Jefferson commissioned Meriwether Lewis and William Clark to find a Northwest Passage to the Pacific. They started from St. Louis on May 14, 1804 and despite severe obstacles, reached the Columbia River and finally sighted the Pacific on November 7, 1805.



Onyx Research Discovered

ONYXSAN

"THE CATION ACTIVE"

PERMANENT SOFT FINISH

Onyxsan is the most potent softener ever developed for cellulosic fibres. In addition, it is "cation active," which means that its softening action is permanent—unchanged by laundering or dry-cleaning.

Onyxsan is easy and economical to use. Add a small amount to the last rinse in the dyebath or finishing mangle. Easily dissolved, stable in use, does not affect whites or colors. Write us of your needs to get a sample of Onyxsan.

ONYX

Onyx

Onyx Oil & Chemical Co., Jersey City, N. J.

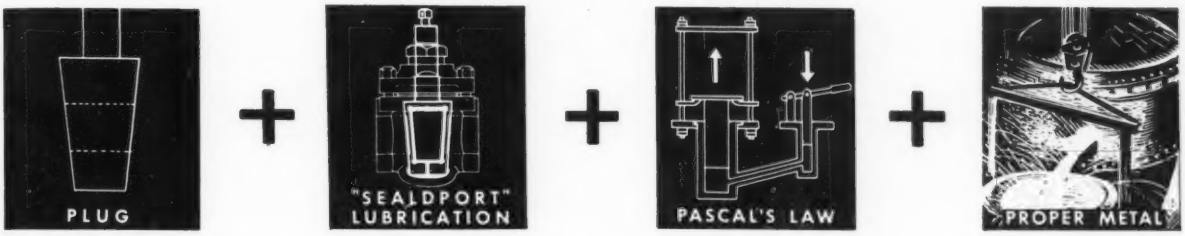
Specialists on Finishing Materials

New England Off. 100 Fountain St., Providence, R. I.
Midw. Repr. Maher Color & Chemical Co., Inc., Chicago
In Canada: Onyx Oil & Chemical Co., Ltd., Montreal

The NORDSTROM VALVE PRINCIPLE

is as old as the hills;

ITS MODERN APPLICATION IS AS ADVANCED AS TOMORROW



NO MEANS of closure is simpler than a plug. Add lubricant and the plug is easier to turn. Add "Sealdport" lubrication and the plug is *always* easy to turn; always sealed against leakage; always tight against its plastic seat. Hydraulic force, effected by merely turning the lubricant screw in a Nordstrom Valve, raises the plug should it ever become hard to turn, and instantly frees the plug. The principle of operation is based on Pascal's Law: "A unit pressure applied to the liquid contained in a sealed vessel is transmitted to every part of the liquid with undiminished force, thus multiplying the force many times."

Nordstrom Lubricated Valves are simplest in design, non-sticking and corrosion-resistant. When closed, not a single drop of line lubricant can leak through. It is the perfect valve for handling dyestuffs, tanning liquors and for gas and air services.

For Dyestuffs Service

For Nordstrom Valves, special lubricants have been developed to handle all kinds of liquors used in the manufacture and handling of dyestuffs. These special lubricants are applied in the valve in stick form. A turn of the lubricant screw increases the hydraulic pressure which is transmitted to the lubricant seat under the valve and raises the plug slightly if the valve becomes hard to turn. Nordstrom Valves are available in sizes from ½" to 30", suitable for all temperatures and pressures.

•

PRODUCTS: NORDSTROM VALVES; EMCO GAS METERS and REGULATORS; PITTSBURGH LIQUID METERS.

NORDSTROM VALVES

— with patented "Sealdport" Lubrication

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B A Soluble Pine Oil
C A Sulphated Ester
D A Sulphated Alcohol
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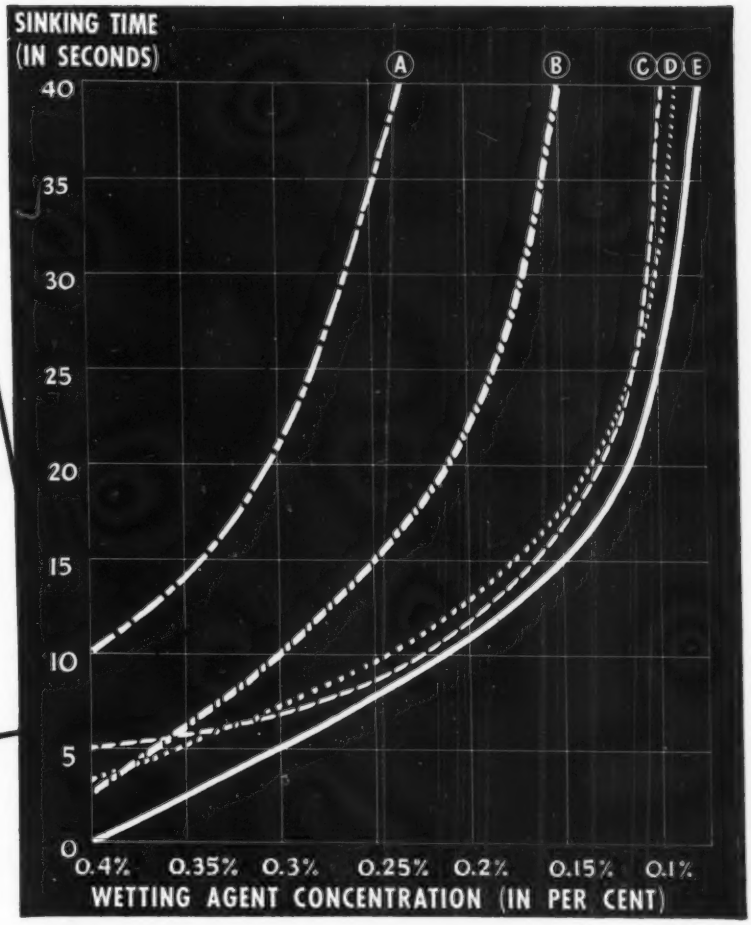

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The instantaneous wetting properties of Wetsit aid in such processes as scouring, bleaching, fulling, dyeing, yarn conditioning, sizing, sanforizing, rinsing, etc.

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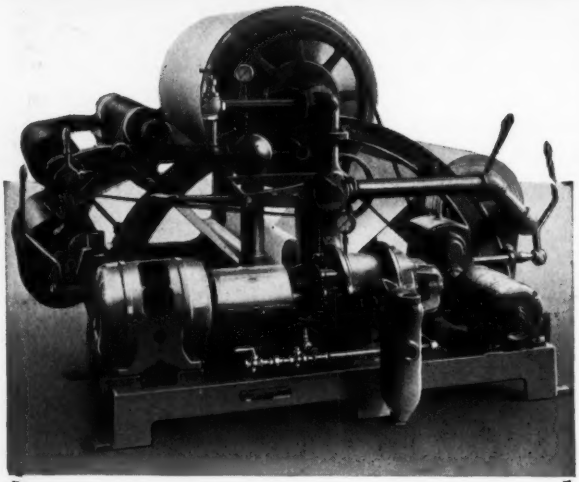

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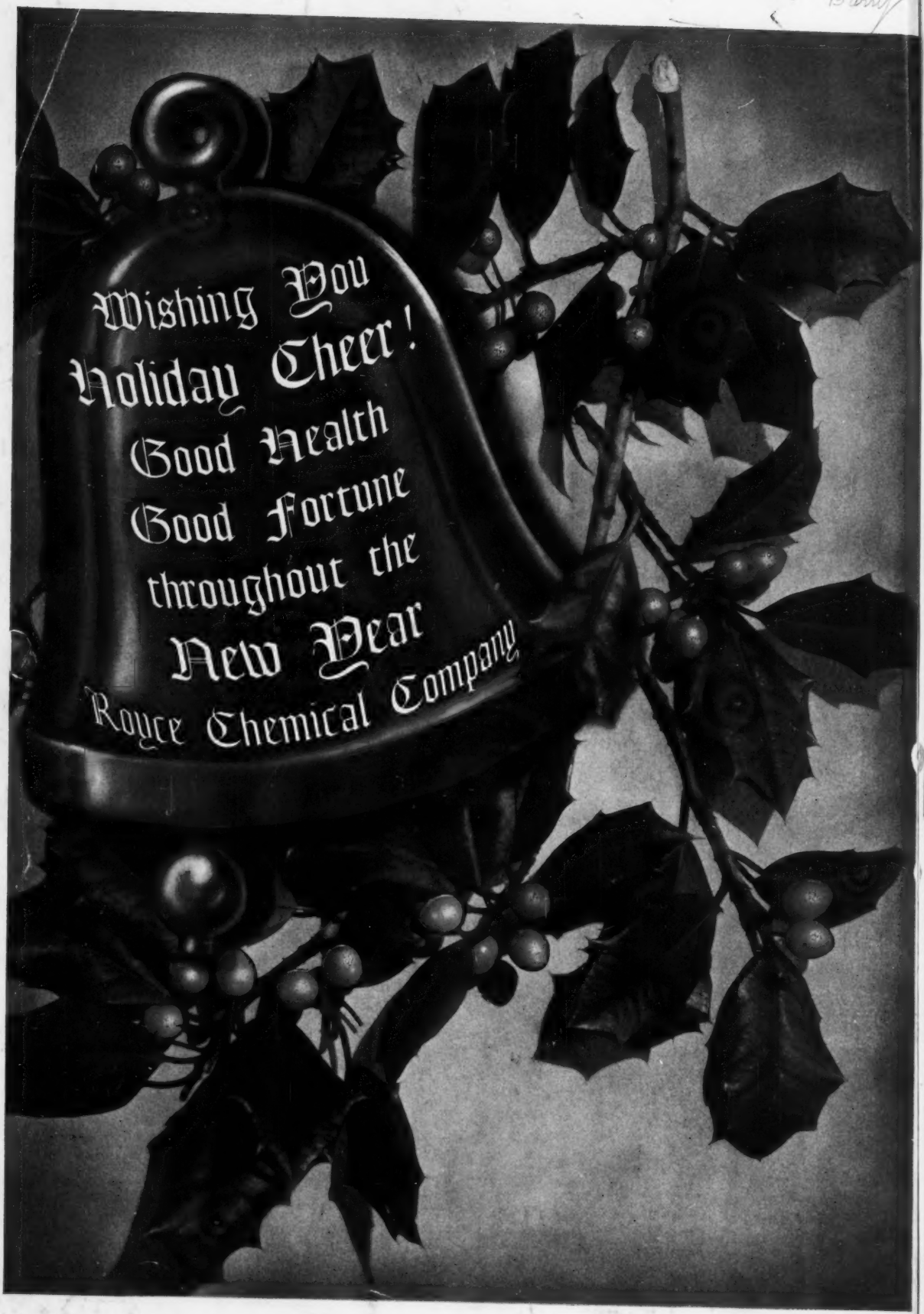
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